ELECTRICAL WORLD

A consolidation of Electrical World, Electrical Engineer and American Electrician

What in the World!

The Northwest has excess generating capacity in utility generating plants; so has the Tennessee Valley. Yet the government is going to build more plants and lines in these localities. It seems to us that both the utilities and the government should turn their attention to sales—anybody can build plants, but what good are they without loads?

●

Experts write in to say the Hood idea of a national uniform rate is good in theory but impracticable for this and that reason. Well, nothing is easy these days and progress is going to hurt somebody. The larger good must dominate all readjustments.

●

Several retailers and contractors say that now at last they will get a show in distribution. The government is going to make the big bad wolves of manufacturers and wholesalers behave. We doubt the conclusion. Now, as in the past, rectification of bad distribution practices will come by industry education and action. All the government can do is to install the scenery.

●

We note that Mr. Hentz said selling the replacement market meant not only selling something newer and better; it meant selling so that saving would care for all the unamortized capital tied up in the equipment replaced. This is sound theory, but we wonder if it is good business and whether capital investments can use this defensive protection under the present competitive conditions. We think a great deal of present investment will never be paid off. We think the necessity to survive will force replacement buying.

●

By the way, there are some interesting developments under way with the American Standards Association. The simplification and commercial standardization work of the Bureau of Standards is to be taken over by the A.S.A. at once. This means a great deal to industry if industry seizes the opportunity.

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ELECTRICAL WORLD

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for the Week Ending

November 11, 1933

L. W. W. MORROW, *Editor*

Leave the Wailing Wall

INDUSTRY must rely upon itself for recovery action. There is no political, financial or administrative short cut to industrial recovery. Business men must make their own readjustments and develop their own manufacture and sales to produce a successful profit-economy in this period of the industrial era. Yet business, especially in the capital goods industry, seems to have forgotten these facts just now. In too many cases the Blue Eagle has become a bird of ill omen in the minds of industrial executives. Dark clouds have displaced the former rosy glow on their horizon. Business whines that all NRA has done is to increase costs by forcing increased wages and more employment. It forgets that the government had only two objectives—the first, to increase employment, and the second, to increase purchasing power. It sold these objectives to industry in return for certain self-government privileges granted to industry. Up to this time the government has done its work with far greater success than industry has acted to earn its own prosperity.

Aside from encouraging policy pronouncements, public works construction and the extension of credit or money to private industry there is little that the government can do or can be expected to do to increase the volume of business or to make industry revamp and readjust its technical, human and material facilities to conform more efficiently to present conditions. Industry must build its own recovery platform. It must quit complaining about NRA; it must cease thinking that the codes will make sales; it must act constructively in its own behalf to rebuild and to sell. The present crisis in recovery has been caused by the failure of industry to act, and not by reason of governmental action or inaction.

What must industry do? Put very bluntly, it must make money on the present volume of business and it must increase the volume of business. Industry can no longer afford to operate on a deficit basis; it can no longer sit back and await the return of the business volume and the business conditions of former years—time, of itself, will never bring back prosperity. Industry must readjust itself better to apply decentralization, multiple selling and selective marketing to profit making in a thin market. Industry must reorganize and must inform itself so that it may sell a rehabilitation instead of an expansion market. Industry must introduce cost finding and market statistics in order to fix a balance of production against consumption. Mammoth production plants must be dismantled to give way to small market area plants in many instances. Full advantage must be taken of the foreign markets for sales under the favorable international currency competitive conditions. This is a time for the keenest possible business administration, with unhesitating elimination of obsolete equipment, excess plant capacity and uneconomical practices and the vigorous adoption and use of new methods and new equipment.

Business must take a bet on the future and quit looking at the past. The government will do its part and more than its part, but only industry can plan the action and carry the objectives.

Above all, industry must change its attitude. There is great merit in what one executive says: "If I could turn loose 5,000 salesmen with a good sales idea and full of conviction and enthusiasm, I believe I could change my entire industrial scene in six months. All salesmen do these days is to weep with buyers on the wailing wall of the depression." No change can be expected, even if facts are faced, when the attitude of industry is pessimistic and negative. The first requirement for recovery is the adoption of a successful sales psychology. This means an enthusiastic determination to face facts and to do business through the intelligent and aggressive application of production and sales ideas.

Rural areas should see municipal acquisition hazards

Farmers produce all the milk and consequently have first claim on the cream. But from the standpoint of utility service it looks as if some of the cities were intent on grabbing the cream and leaving only thin buttermilk to the farmer. The "service" committee of the National Association of Railroad and Utilities Commissioners recognizes this hazard as one of the components of the current wave of municipal acquisitions or preliminaries thereto. Splitting of the properties in this way may well ruin some of the private utilities involved, but in the end it is going to be the rural population which will suffer. That holds even if the cities exercise the right, already granted in some states, to serve adjacent areas because that is a voluntary privilege and not a binding obligation on the cities.

In California one commissioner in opposing one of these municipal acquisitions said "the time is not far distant when the (rural) burden will become too great and agriculture will be compelled to forego the use of electric energy or utilities will be compelled to furnish it at a figure which would not return sufficient compensation to warrant maintenance of systems." Agricultural areas really got their electricity only when these systems were integrated and viewed their responsibilities as broadly social ones. To dismember them now piece by piece is certain to be detrimental to the farmer, and he should sense what selfish municipal agitation means to him. He may ultimately find himself faced with two alternatives—paying whatever it costs to serve him alone or using his uncertain political power to keep the city contingent from hogging a state-socialism utility venture. Rural customers are, if they only knew it, the natural allies of the logically established state-wide utility systems.

Wanted: the perfect a.c. adjustable-speed motor

With all due credit to the ingenuity that has been devoted to devising a.c. motors that have flexibility of speed adjustment, it incurs no great risk to say that the best of them fail to satisfy as complete substitutes for their d.c. equivalent. Hardly a more promising field of application exists than the driving of machine tools, especially those that have to meet wide ranges of spindle and cutting speeds. The makers of these tools have adopted multi-speed motors to a considerable extent, but in practically no instance has the available adjustable-speed motor made much more than an entering wedge. Meanwhile there is adherence to gear boxes, cone pulleys and other speed-changing devices that, while good, would be replaced as soon as a superseder clearly won its place in the sun.

Objections to today's adjustable-speed a.c. motors are those of cost, size, intricacy and performance. Some of these appear to be inherent difficulties. But so did those which delayed the advent of the induction motor. Sooner or later some new Ferraris or Steinmetz will find a practical way to pry the a.c. motor from its frequency fetters so that it can run simply, steadily and vigorously at any speed. The motor designer has always before him this challenge to his ingenuity. The mechanical world waits patiently for his success, in the meantime politely accepting rectification, pole-changing and brush shifting as quite feasible stop-gaps.

THE WEEK

Election Day Reverses for Municipals

NINE major communities and a number of minor ones voted on Tuesday upon various proposals to adopt or authorize municipal light and power plants. Private enterprise was definitely a victor in six of the more important instances and not a complete loser in two others.

Cincinnati, Ohio, defeated proposals for municipal ownership of electric and gas facilities by a vote of nearly two to one.

Youngstown, Ohio, turned down a proposal to issue $500,000 in bonds to acquire a municipal electric distribution system by roughly 19,700 to 14,500.

Portsmouth, Ohio, turned down municipal plant proposals by three to two.

Salt Lake City, Utah, balked by three to one the $18,000,000 bond plan for a municipal power plant.

San Francisco, Calif., by 72,773 to 71,465 defeated a plan for a $6,308,000 issue of bonds for the building of a 20,000-kw. hydro plant at Red Mountain Bar on the Hetch-Hetchy water supply system. A two-thirds favorable majority would have been required for passage. The Federal Public Works Administration had granted $1,400,000 toward the project.

Bordentown, N. J., voted two to one in favor of retaining private operation.

Camden, N. J., voted in favor of a municipal electric light and power plant by about two and a half to one. The authorization given by the electorate was permissive and not mandatory, however, and as Camden has a debt of more than $30,000,000, has more than $6,000,000 due in unpaid taxes and has for some months been paying firemen, policemen and school teachers partly in scrip, the likelihood of an $11,000,000 power project seems slim indeed.

Akron, Ohio, voted 23,800 to 22,200 in favor of a municipal plant, but is only a declaration of intention and must be voted upon again at the next general election if the City Council has by then devised ways and means to effect such a plan.

Sandusky, Ohio, voted 6,500 to 2,400 for a $1,400,000 municipal plant.

Columbus, Ohio, voted an $824,000 bond issue to extend its existing municipal power plant facilities. Cuyahoga Falls, Ohio, voted similarly. Fleetwood, Pa., went municipal, as did Doniphan, Mo.

Among the smaller communities to turn down private energy supply facilities was Tyrone, Pa.

T.V.A. Power Voted in Alabama

Two additional Alabama cities last week voted in favor of municipal operation with a view to getting electric power from Muscle Shoals, bringing the total in that state to eleven. Decatur poled 1,438 to 501 and Oneonta 218 to 47. Jasper will vote November 27 to decide the municipal power plant proposal.

Tupelo, Miss., which last week signed for T.V.A. power and agreed to distribute it at T.V.A. rate schedules, may have some worries for the city fathers before long. The city, a distributor of purchased energy, paid the Mississippi Power Company $32,114.70 for 1,889,100 kw.-hr. in 1932 under a 1.7-cent rate. At 8 mills per kilowatt-hour it could save $17,000 a year on the 1932 basis with purchases of T.V.A. power. But new consumer schedules would bring an estimated reduction in revenue of $48,000, thereby indicating a net loss to the city of roughly $31,000. Increased sales to users can, of course, offset this differential.

Preliminary surveys for the construction of the General Joe Wheeler Dam, known as Dam No. 3, have been completed by the Tennessee Valley Authority, according to an announcement made by Chairman Arthur E. Morgan. T.V.A. has awarded a contract for 675 miles of aluminum conductor cable, steel reinforced, to the Aluminum Company of America. The conductor is to be used in the construction of the tie transmission line between Muscle Shoals and Norris Dam. The Aluminum Company's bid of $400,149.39 for the conductor and accessories showed a saving of approximately $278,000 over the next lowest bid. The tie transmission line is approximately 228 miles long.

P.W.A. Funds for Power Projects

Several municipalities have been granted federal public works funds for power projects in accordance with Secretary of the Interior and Federal Administrator of Public Works Harold L. Ickes' recent assurances (ELECTRICAL WORLD, November 4, page 581).

Fort Collins, Colo., has been granted $738,000 and Springfield, Ill., given an allotment of $78,000 to help finance improvements, including a power plant. A grant of $24,000 has been made to Chambersburg, Pa., to aid in the installation of a 2,500-kw. turbo-generator, with condensers, air cooler and accessories.

Government contract for the construction of a $3,000,000 municipal hydro-electric plant at Danville, Va., funds for which already have been made available through a loan and grant from the federal emergency administration of public works, has not yet been formulated. When the contract is finally drawn up it must be submitted to the City Council for acceptance or rejection. If approved a date will be set for a referendum.

North Platte (Neb.) Public Power and Irrigation District, known as the Sutherland project, has been allotted $7,500,000 by P.W.A. for a diversion dam and storage reservoir. Verde irrigation and power project in Arizona has been given $4,000,000.

An allotment of $6,000,000 to begin construction of the All-American Canal designed to provide an abundant supply of water to the Imperial Valley in California has been announced by Administrator Ickes. The approximate total cost of the project is $27,000,000, not including power features which may be developed later.

After long deliberation the Public Works Administration has approved a loan of $2,600,000 for the construction of a dam and hydro-electric plant on the Pecos River at Red Bluff, N. M. (ELECTRICAL WORLD, September 9, page 329). Of the total amount approximately $570,000 is a direct grant and will not have to be repaid.

A federal grant is being sought to construct a dam and hydro-electric plant at a point immediately below the junction of the Ouachita and Red rivers, 5 miles northwest of Denison, Texas, at a cost of $35,000,000. The proposed hydro-electric plant would have a capacity of 55,000 hp. and electrical energy would be transmitted to various communities located in Oklahoma and North Texas.

Application to the federal Public Works Administration for $8,217,500 for construction of an electrical generating and distributing system with a steam turbine plant at Gillette, Wyo., to furnish electric service and power to the Black Hills towns and cities and Wyoming localities in the Big Horn region has been sent to Washington.

Pennsylvania Railroad Granted $84,000,000

To complete its electrification program through to Washington the Pennsylvania Railroad has been favored in a resolution by the special Board of Public Works with financial aid in the form of a loan of a sum not to exceed $84,000,000.

The principal items on the Pennsylvania Railroad's program are: $15,800,000 for carrying electrification through to Washington for both passenger and freight operation; $16,525,000 for 132 electric locomotives; $1,087,000 for 23 multiple-unit passenger cars; $16,000,000 for 7,000 freight cars; $2,611,000 for widening and making two-track tunnel at Baltimore; $2,041,000 for Virginia Avenue tunnel in Washington, and $750,000 for reconstruction of tracks at Elkton, Md.

▼

Southern California Edison Plans New-Business Drive

More than $1,000,000 will be expended by the Southern California Edison Company, Ltd., in making effective a twelve-month campaign for more business. Dealer co-operation will be a feature. Harry J. Bauer, president of the company, has announced that: "In order to do our part in bringing about business recovery in the country, and particularly in southern California, we have for a long time been considering ways and means of putting men to work. This of necessity must be creative work, else it will be at the expense of the company or the consumers. We have long felt that many households did not make that use of electricity which modern standards of living demand. We have also concluded that methods of introduction of labor-saving devices in the home and factory have not been of such character as to produce the required results. The sale of these articles, in so far as possible, we believe should be through normal dealer channels.

"This sales promotion program which we are now inaugurating will enable us to not only place approximately 100 men in our own organization, at useful, creative tasks, but the fact that we are practically turning over to the dealers the actual sales work of this campaign will make it possible for them to enlarge upon their sales organizations measurably."

The company's new commercial program, details of which are not yet available, will be designed specifically to permit the continuance of the present low rate structure by maintaining and building up the high per capita consumption of electricity on Edison lines, Mr. Bauer announced. The company recognizes, he said, that the domestic consumer class represents the logical field for the further development of popularizing use of electricity, and that the basis for further rate reductions hinges almost entirely on the greater use of electric energy.

In its new program the company will virtually discontinue the direct merchandising of certain of the large appliances, such as electric ranges and refrigerators, and concentrate its sales and advertising activities largely on promotional efforts to aid appliance dealers.

▼

Kootenay River Project Approved

Approval of the reclamation scheme of the Kootenay Power & Development Company on the west side of the Kootenay River in British Columbia, north of the international boundary (ELECTRICAL WORLD, September 16, page 360) was granted by the International Joint Commission at its semi-annual session at Ottawa. All of the six commissioners, three from the United States and three from Canada, were present, C. A. Magrath, the Canadian chairman, presiding. Approval of the reclamation scheme on Kootenay flats at Creston will allow the company to rebuild dams taken out some years ago by high water, and to construct other dams in the vicinity to protect some 7,000 or 8,000 acres of reclaimed land.

Los Angeles-Sierras Contract Brings Injunction Appeal

Signing of a contract for purchase by the city of Los Angeles, Calif., of land and water rights of the Southern Sierras Power Company in the Owens River Valley for $6,740,000 has followed action by the City Council ratifying resolutions of the Board of Water and Power Commissioners authorizing such procedure. The purchase plan includes: The Owens River Gorge and Hillside Ranch property, $2,580,000; Leevining Creek and Mill Creek waters, $1,930,000, and Rush Creek waters, with the Parker Creek tributary, $2,230,000. The Owens River Gorge portion of the transaction includes two power plants, now in operation, and a reservoir site. Plans have been prepared for development of the properties, both as to water and power.

Almost simultaneously with the ratification by the Council of the agreement, a petition was filed in the Superior Court asking for an injunction to restrain the carrying out of the contract. The petition, which was filed on behalf of a taxpayer, charges that $750,000 of the purchase price will be used "to pay political agent and lobbyists" who assertedly engineered the deal for the city. The petition makes additional charges and declares that if the contract is carried out taxpayers will suffer.

▼

Another Link in the British Grid

Wide World

Down a bare mountainside in central Scotland drop these two 12.5-ft. pipe lines to supply the second of two stations in the Grampian power scheme, both to be linked with the British grid. The waters of Loch Ericht already supply power to the grid. Loch Rannoch will supply the Tummel Bridge hydro station shown here within a few weeks.

Insull Extradition Off; U. S. Denounces Treaty

No further attempts to extradite Samuel Insull can be made as long as he remains in Greece, Secretary of State Hull indicated this week. As a result of the failure of the American efforts to secure Mr. Insull's return a strong protest has been handed by Lincoln MacVeagh, the United States Minister, to the Director of the Foreign Ministry, denouncing the extradition treaty between the two countries as worthless. The note read in part: "My government finds it difficult to reconcile this unusual decision with the admission of the competent authorities that the fugitive committed the acts with which he was charged and that these acts are illegal and fraudulent, both in the United States and Greece.

"Without going into the details of the decision, it is evident that the authorities attempted actually to try the case instead of confining themselves to ascertaining whether the evidence submitted by the United States government was sufficient to justify the fugitive's apprehension and commitment for trial . . . Inasmuch as the Greek authorities have now seen fit on two occasions to deny the just requests of the United States made under the provisions of the above-mentioned treaty, it is apparent that this treaty, although similar in terms to treaties which the United States has found effective in extraditing fugitives from other countries, cannot be relied upon to effect the extradition of fugitives who have fled to Greece. My government therefore considers that from the American point of view the treaty is entirely useless. Accordingly, I am instructed to give formal notice herewith of my government's denunciation of the treaty with a view to its termination at the earliest date possible under its pertinent provisions."

▼

Schenectady Mercury Turbine

Preliminary operation of its new outdoor 20,000-kw. mercury-vapor turbogenerator at Schenectady was inaugurated by the General Electric Company late in October. This new generating station, to be leased to and ooperated by the New York Power & Light Corporation, will supply the power company's transmission system electrically and the General Electric factory with team. In addition to the by-product output of 330,000 lb. of steam per hour from the mercury condenser the station will supply 300,000 lb. of steam per hour.

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Abitibi Contract Completed

Completion of an agreement with the Canada Northern Power Corporation, Ltd., under which the company agrees to purchase from the Hydro-Electric Power Commission of Ontario for a period of ten years all the additional power which it requires to supply its growth load from its various properties after January 1, has been announced by J. R. Cooke, chairman of the commission. The agreement involves the sale of the first Abitibi Canyon power since that development was acquired by Hydro.

▼

Stabilization Rumors Persist

The captains and the kings depart, also, it has been quite irreverently said, the second lieutenants. With the quick and embarrassing failure of the gold-buying policy to accomplish anything that was hoped of it another member of the Brain Trust will, one hears, leave its encouragingly thinning ranks. Whether or not realities will be faced before it is too late seems the big problem now.

Dominating the financial picture for some weeks has been the persistent flight of American capital from this country, where capital is all-too-obviously in dire jeopardy. Great Britain appears to offer the refuge of highest popularity. Should the tide turn not only will repatriation be somewhat difficult but security markets should rise from their desperate doldrums.

Election results show little positive encouragement for municipal ownership projects and spell the finish of national prohibition. Trade continues dull. Carloadings off 2.1 per cent in the most recent figures, but remain 3.1 per cent over last year. Electrical energy production shows little change. Lumber output continues decline. Steel at low levels of activity. Automobile makers reduce operations to prepare for 1934 models. Bituminous coal output continues to rise. Commodity prices dull. General indexes show some slackening in the decline.

Telltales of retail trade conflict. Sears-Roebuck reports sales increase of 20 per cent over last year in four weeks ending November 5. Chain grocers recognize shift from them to independents; all over price differentials, partly induced by degrees of NRA compliance. One national organization, however, reports increasing its sales 60 per cent over same week a year ago by substituting lower-priced merchandise and actively pushing it. Just another way of saying that there is life in trade yet, but it may need old-fashioned stimuli.

A decline of $334,000,000 in but 29 listed utility stocks in one month following two preceding drops of $645,000,000 and $522,000,000 with a $79,000,000 gain in between tells a financial story of moment.

Swope Tells More of Plan for NRA Administration

Announced only sketchily a week ago, more details of his proposed National Economic Council were given by Gerard W. Swope, president of General Electric Company and active in the Industrial Advisory Board of NRA, at the sessions of the Academy of Political Science in New York on Wednesday. A national chamber of commerce and industry would be formed to integrate the trade groupings already encouraged under NRA. It would delegate four representatives to the National Economic Council, general labor four, transportation labor four, agriculture four, transportation four, Federal Reserve banks four, the President five, for and from the public at large. The Departments of Commerce, Agriculture, Transportation, Labor and Treasury would be accorded one representative each.

These 34 men would study economic changes in perspective and at close range and from time to time advise the Administration on the measures they believe would be most effective in maintaining business equilibrium and mitigating the extremes of oscillation toward prosperity and depression.

Edison Company Wins Point in Union Group Row

Attempts by the Brotherhood of Edison Employees to obtain a temporary order enjoining the New York Edison Company from circulating or permitting to be circulated petitions by its employees seeking to bar the brotherhood, an independent organization, or the American Federation of Labor from attempting to organize the company's workers failed this week in United States District Court. A motion for a restraining order was made by Jerome Count, attorney for the brotherhood. Judge Goddard, who heard the case, refused to issue the order which was sought in the litigation instituted by the brotherhood last week (ELECTRICAL WORLD, November 4, page 579) against the company and the organization of its employees styled by the brotherhood as a company union.

Mr. Count contended the petitions to be inspired by the company in violation of the collective bargaining provision of the national recovery act. William L. Ransom, counsel for the company, maintained that the petitions were being circulated solely on the initiative of the empoyees. Judge Goddard gave Mr. Count permission to request an immediate hearing on a motion for a permanent injunction to restrain the circulation of the petitions.

Upon being questioned by the Regional Labor Board, President Frank W. Smith of the Edison company replied that the circulating of the petitions originated wholly with the employees "who apparently wanted to express their views, as is their right . . ." "It would be inconsistent with my policy for me or the company to interfere with employees in such a matter," Mr. Smith said.

Coming Meetings

American Society of Mechanical Engineers—New York, N. Y., December 4-9. C. W. Rice, 29 West 39th St., New York.

American Institute of Electrical Engineers — New York, N. Y., January 23-26. H. H. Henline, 29 West 39th St., New York.

▼

Alabama Power Protests Old Power Board Action

Constitutionality of action taken by the Federal Power Commission in 1932 in connection with the Mitchell Dam project on Coosa River in Alabama has been attacked in District of Columbia Supreme Court by the Alabama Power Company.

The company's attorneys argue that the commission exceeded the authority conferred by the federal water power act and that the action was unconstitutional as depriving the plaintiff of property without due process of law. It is also claimed that the commission rendered its decision under an erroneous construction of the power act which wrongfully delegated judicial power to an administrative tribunal.

The court was asked to declare invalid the commission's decision and to expunge the records containing this ruling. In answer, Oswald Ryan, general counsel for the commission, and Assistant District Attorney John T. Fihelly, have contended the Federal Power Commission to be not suable; that the commission's order of 1932 was not final and cannot be reviewed by the court, and that the administrative authority of the commission is not subject to court control.

Appeals in the Appalachian Electric Power-Federal Power Commission-New River case are reported pending.

▼

Kansas Ex-Commissioner Aspires to Governor's Chair

Thurman Hill, farmer member of the Kansas Public Service Commission, now a willing candidate for nomination as Governor, has introduced the utility theme into recent speeches.

Mr. Hill would base his entire campaign on a platform of reasonable power, gas, telephone and water rates. As a former member of the state commission he was a leader in the state's battle for lower gas rates. He has proposed amendments to the Kansas laws that would eliminate some of the legal technicalities into which the commission bumped.

"I would give the commission power," he said, "to reject any initial filing of a schedule of rates that on its face discloses the rates were not fair and reasonable. Now the utilities can file a schedule and the corporation commission has to accept it. Then if there is a motion for an investigation, the utilities can delay the matter for many months.

"I would modify the act so there can be some competition, rather than restricting a community in Kansas to be served by one utility having a monopoly on the service."

Mr. Hill proposed further, that the state legislature fix the maximum return on the utility's investment so that it would not exceed 6 per cent.

"I also should like to see Kansas adopt a law assessing the costs of appraisal for rate-making purposes against the utilities, instead of having to go to the state Legislature for an appropriation."

▼

Assessment Reduction Suits Brought in Wisconsin

Two Wisconsin utilities filed suits in October in Dane County Circuit Court against the Wisconsin Tax Commission and state treasurer, seeking assessment and tax cuts for 1933. The Milwaukee Electric Railway & Light Company in its suit sets forth that its 1933 assessment is $136,000,000 and taxes due December 1 amount to $2,649,489.44. It seeks to have this set aside and an assessment of the property fixed by the court. The complaint alleges the assessment exceeds the fair book value of the properties of $123,302,057 by $12,600,000, or more than 10 per cent; that the fair market value of the corporation's securities is $79,585,404, $21,000,000 below the assessed value; that the value based on earnings is $114,772,941.

In the second suit the Wisconsin Gas & Electric Company seeks to have set aside an assessment of $26,500,000 and taxes of $516,260.81. The suit sets forth that the assessment value is equivalent to a capitalization so high that only 5.65 per cent return would be received. This figure is based on an average of earnings for the last three years.

Further, the complaint alleges a fair market value of the property is $20,262,124, the book value of the securities representing this property is only $21,773,372, and that capitalization based on earnings would be but $20,000,000.

▼

Sultan River Plan Setback

Following protest by the city of Everett, Wash., against the issuance of a preliminary permit to the Great Northern Power Company for the use of the Sultan River and other streams tributary to the Skykomish River the Federal Power Commission has investigated the dual water uses involved and decided that the "excessive cost of power development combined with unfavorable market conditions constitute economic unfeasibility" of carrying out the power project.

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Georgia Utility Sued by City of Waycross

In an effort to compel filing of a quarterly statement of gross receipts and to have books of the company submitted to the city for examination, the city of Waycross has filed suit against the Georgia Power & Light Company. The company operates under a franchise which provides payment to the city of 3 per cent of its gross revenue yearly. This sum is in lieu of a purchase price for the franchise, license or occupational taxes and an ad valorem tax on the value of the franchise.

Since granting of the franchise in 1909 the company has established lines to Blackshear, Patterson, Screven, Offerman, Cogdell, Homerville, Dupont, Waresboro and other communities. The city contends the 3 per cent of gross revenue should apply to these extensions.

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Indiana Salaries Listed by Utilities Commission

According to figures filed with the Indiana Public Service Commission at its request, President John N. Shannahan of Public Service Company of Indiana receives $8,350 a year salary from that organization and a total of $40,000 from the entire group of companies affiliated with it.

Salaries paid to vice-presidents range up to $12,500 a year. Neither Samuel Insull nor Samuel Insull, Jr., received any salary from Public Service Company of Indiana in 1929, 1930 or 1931. Samuel Insull, Jr., received compensation for services as chairman in 1932, however.

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Georgia Commission Heard

Although the Supreme Court of Georgia has concluded its hearing of arguments on the appealed certioraries of four of the suspended members of the Georgia Public Service Commission, James A. Perry, Albert Woodruff, Walter R. McDonald and Jule W. Felton, decision has not yet been announced. The court grouped the four appealed cases and heard all of the evidence at once. Attorneys for the ex-commissioners contended that the statute under which the Governor removed the commissioners does not define the disqualifications on which the chief executive may act, and that the commissioners are entitled to a judicial determination of its meaning.

Virginia Electric Report Submitted to Commission

In a report submitted to the State Corporation Commission the Allen J. Saville organization, retained by the commission, has placed the net return received by the Virginia Electric & Power Company upon electric operations in 1932 at 9.25 per cent and the average return upon all operations at at least 6.68 per cent. The valuation of electric properties for rate-making purposes—the rate base on electric operation—was fixed at $45,317,474 and the net revenue at $4,-180,886. The net return for 1933 was estimated at 8.35 per cent, the 1933 valuation being figured at $45,800,000 and the net profit at $3,828,794. The net profit figure reflects the effect of new federal taxes and of NRA operating conditions, together with other depression factors.

Presenting the report at a conference open to representatives of the city of Richmond and of Norfolk, Petersmouth, Portsmouth and all the other communities served by the company, Mr. Saville praised the utility and its affiliated companies for their wide-open co-operation in the exhaustive study. The report, consisting of 109 pages of analysis and 50 statistical tables, was reviewed section by section at the conference. Representatives of the communities served by the company will be given an opportunity to hear and comment upon the report before the commission.

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Utility Head Suggests Fair Competitive Basis

Addressing the Spokane Chamber of Commerce and a radio audience of the Northwest, President Frank T. Post of the Washington Water Power Company has pointed to some of the fallacies of government intrusion into the power business and offered highly tangible suggestions for "fair competition" between public and private enterprise.

"Our company is not undertaking in any manner to interfere with the building of the proposed Grand Coulee dam and power plant," said Mr. Post. "What it desires is simply a square deal. We ask that the contract to be made between the United States government and the state of Washington, or some bureau or commission thereof, shall be a contract of fair competition in accord with the recent act of Congress called the national industrial recovery act. That statute declares it to be the policy of Congress "to eliminate unfair competitive practices, to promote the fullest possible utilization of the present productive capacity of industries."

To make this contract accord with the principles enunciated by Congress and a contract of fair competition and otherwise just and reasonable, it should contain the following guaranties and stipulations briefly stated as follows:

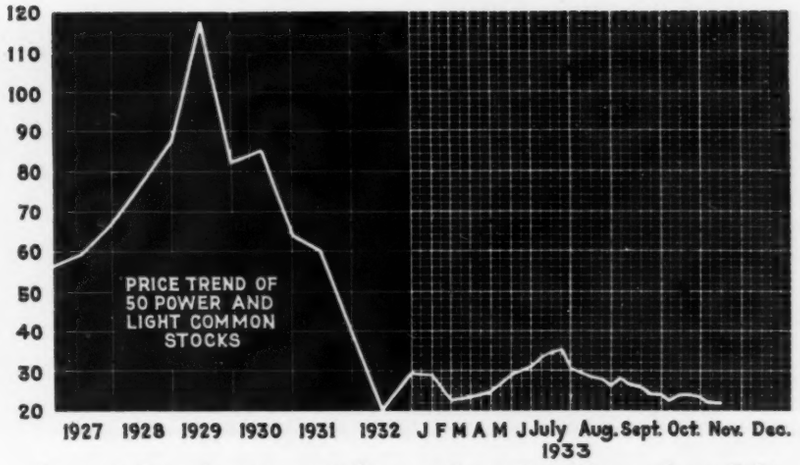
1. That the rates charged for Grand Coulee power shall be fair, just and reasonable, in view of the entire cost of the plant and all expenses of operation, the same to be subject to regulation by the Department of Public Works as is the case with our company.

2. That some reasonable percentage of gross revenue shall be annually paid into the treasury of this state in lieu of taxes and there placed to the credit of the school fund, or, if you please, any other fund designated by the Governor, such percentage to approximate the average percentage of gross revenue paid for taxes by the privately owned electric light and power companies, the amount to be determined by the Department of Public Works.

3. Appropriate provisions for setting aside reserves for depreciation and for keeping accounts according to established rules and regulations the same as our company.

In all probability the proposed power plant will not be in operation before five years from this date. We are confident that there will be considerable improvement in business during that period of time. We are confident that some of our surplus power (now about 100,000 kw.) will be absorbed in the markets. We hope that much of it will be so absorbed. There can be no question that our company will not build plants during those five years. If, when this proposed power plant is in operation, or soon thereafter, our company shall be in need of more power than it generates to fill the requirements of its customers and it can buy power generated at this proposed power plant at a reasonable price, it would seem to me to be self-evident that it will undertake to buy there so much of such power as it may need.

Stocks Steady in Dull Market



In a market of extreme dullness and small trading volume light and power common stocks drifted upward through election day; then rallied. "Electrical World" average 22.3; last week 22.1

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Ontario Projects Report

According to J. R. Cooke, chairman of the Ontario Hydro-Electric Power Commission, 77 municipalities in Ontario are now in a position to burn their power mortgages and seven other municipalities have reached the stage in profitable development where their liquid assets are within 10 per cent of their liabilities. Fifty-one of the 77 municipalities now able to burn their power mortgage are in the Niagara system; fourteen in the Georgian Bay system, eleven in the eastern Ontario system and one, Port Arthur, in the northern Ontario link.

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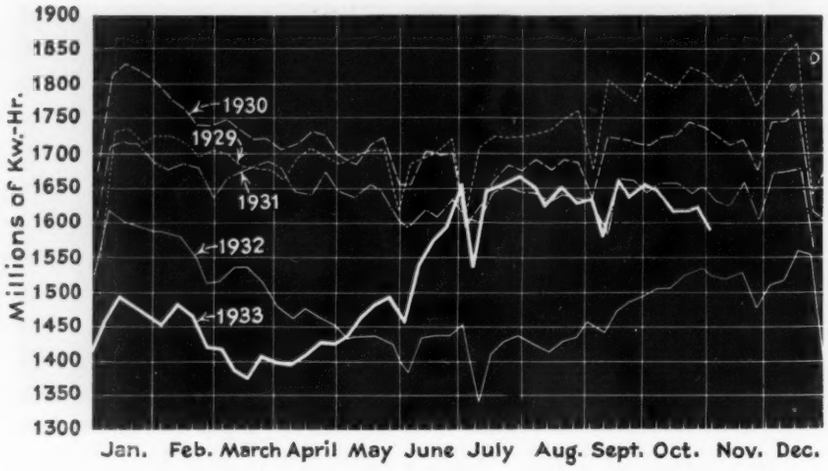
Holding Company to Join in Deal

Receivers for the American Commonwealths Power Corporation have applied to the Chancery Court in Wilmington, Del., for permission to participate in the reorganization plans of the National Gas & Electric Corporation and the General Public Utilities Company, formerly subsidiaries of the Commonwealths company. Under the plan, intercompany debt and stock owned by the American Commonwealths Power receivership estate is entitled to 10.65 per cent of the common shares of the new company to be organized to replace the National Gas & Electric Corporation. American Commonwealths Power also owns $146,531 of unsecured debt of the General Public Utilities Company and under that company's reorganization plan will be entitled to 5,861 common shares in the company that will succeed it.

Weekly Output Declines



Energy production by electric light and power companies continues to resist the seasonal rise usual at this time of the year. While the output for the week ended November 4, announced as 1,583,412,000 kw.-hr. by the Edison Electric Institute, still exceeds last year's for the corresponding week the excess has narrowed to 3.8 per cent. and the deficiency compared with 1932 amounts to 2.8 per cent.

The largest gain over 1932 again appears in the Mountain states, now risen above 29 per cent. New England has lately been running consistently about 5 per cent ahead. The shrinkage in the Central industrial area from 8.2 to 5.5 per cent is partly due to an improvement last year. Other regions are close to the 1932 level.

Weekly Output, Millions of Kw.-Hr.

1933		1932		1931	
Nov. 4	1,583	Nov. 5	1,525	Nov. 7	1,628
Oct. 28	1,622	Oct. 29	1,533	Oct. 31	1,652
Oct. 21	1,619	Oct. 22	1,528	Oct. 24	1,647
Oct. 14	1,619	Oct. 15	1,508	Oct. 17	1,656
Oct. 7	1,646	Oct. 8	1,506	Oct. 10	1,653

Per Cent Change from Previous Year

Region	Week ended Nov. 4	Oct. 28	Oct. 21
New England	+ 5.2	+ 4.8	+ 5.5
Middle Atlantic	+ 1.0	+ 4.2	+ 1.8
Central Industrial	+ 5.5	+ 8.2	+ 9.2
West Central	— 0.6	+ 0.5	+ 0.0
Southern States	+ 0.8	+ 2.5	+ 3.6
Rocky Mountain	+29.2	+22.8	+22.4
Pacific Coast	— 0.8	+ 0.7	+ 0.7
United States	+ 3.8	+ 5.8	+ 5.9

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Power Census Statistics for 1932 Completed

Data for ten additional states, given in somewhat abbreviated form in the accompanying table, complete the first series of preliminary reports by the Bureau of the Census on the results of the recent quinquennial canvass of the electric light and power industry. Similar statistics for the other states have been published weekly, as they became available, in recent issues of ELECTRICAL WORLD.

States in the present group, widely scattered throughout the country, show the same tendencies as others for the five-year period. Number of establishments decreased conspicuously — those privately owned from 567 to 486, municipals from 672 to 554. The multiplicity of the latter in the Central States is again in evidence, contrasted with their smaller number in other regions. Analyses of relative capacity, output and customers must await the publication of further statistics.

Plant capacity increased greatly in all of this group except West Virginia. Output was larger in seven of the ten, despite the abnormality of 1932 as a year of extreme industrial inactivity, but production per kilowatt was smaller with the remarkable exception of Louisiana.

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British Output Increases

Authorized undertakings in the United Kingdom in the month of September produced 1,023,000,000 kw.-hr., as compared with 923,000,000 kw.-hr. in September, 1932, an increase of 10.8 per cent. In the first nine months of the current year 9,352,000,000 kw.-hr. was generated, an increase of 8.2 per cent over the corresponding period of last year.

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Egyptian Station in Operation

Two of the three 2,500-kw. turbo-generators to be installed in the Edfu station by the Egyptian Ministry of Works are now in operation. This plant is part of a comprehensive scheme on the part of the government to furnish energy for irrigational pumping and the utilization of hitherto arid tracts (ELECTRICAL WORLD, January 14, page 54).

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British Rural Use

Most recent reports indicate that there are over 5,000 fully electrified farms in Great Britain against about 1,000 a few years ago. In 1930 there were estimated to be 2,500 fully electrified farms in Britain.

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Electrification Progresses in Italy

Information based on reports from 1,176 private electric supply undertakings and 28 mixed private and municipal companies indicates that the hydro-electric installations in Italy increased during

Census Reports on Electric Light and Power Establishments

	Kansas		California		Michigan		West Virginia		Indiana	
	1932	1927	1932	1927	1932	1927	1932	1927	1932	1927
No. of reporting establishments	184	253	63	75	102	140	41	55	134	157
Commercial	38	30	42	52	51	66	37	48	52	73
Municipal	146	223	21	23	51	74	4	7	82	84
No. reporting distribution only	100	139	33	42	28	37	26	27	82	99
Prime movers, total hp	578,729	491,572	3,897,516	2,780,746	2,234,955	1,618,740	731,400	755,268	1,331,301	869,925
Steam turbines, hp	472,757	396,924	1,507,919	894,273	1,744,090	1,238,702	638,441	658,036	1,247,355	779,987
Steam engines, hp	16,425	22,958	22,330	35,540	6,197	13,484	2,437	5,837	16,311	36,640
Int. combustion engines, hp	75,147	47,614	9,273	6,010	14,091	10,646	6,739	6,734	12,657	4,735
Hydro-turbines, hp	14,400	14,076	2,357,994	1,844,923	470,577	355,908	83,783	84,661	54,978	48,563
Generators, kw	431,489	358,218	2,864,359	1,964,990	1,659,436	1,188,880	538,825	564,527	987,882	653,063
Output, thous. kw.-hr	875,607	830,685	7,901,339	7,060,973	3,532,623	3,773,636	1,442,443	1,902,820	2,422,940	1,746,153

	Wisconsin		Maine		Louisiana		Ohio		Tennessee	
	1932	1927	1932	1927	1932	1927	1932	1927	1932	1927
No. of reporting establishments	177	184	55	70	47	51	191	207	46	55
Commercial	92	97	47	62	19	17	79	93	29	37
Municipal	85	87	8	8	28	34	112	114	17	18
No. reporting distribution only	93	109	27	36	8	3	122	126	18	18
Prime movers, total hp	1,183,512	920,615	352,999	252,316	467,084	276,900	2,917,041	2,354,554	578,618	455,965
Steam turbines, hp	768,648	549,886	71,511	49,000	426,042	243,238	2,844,421	2,254,681	266,307	262,710
Steam engines, hp	36,052	55,481	1,350	700	2,685	3,375	43,572	71,888	17,655	17,563
Int. combustion engines, hp	13,555	6,617	2,203	775	38,357	30,287	7,645	5,332	5,017	3,454
Hydro-turbines, hp	365,257	308,631	278,115	201,841	.....	.....	21,403	22,653	289,639	172,238
Generators, kw	849,190	624,380	265,153	179,364	328,623	207,542	2,145,414	1,742,856	425,541	338,412
Output, thous. kw.-hr	1,834,784	1,892,737	762,112	560,664	1,171,951	634,594	4,868,954	4,724,016	1,050,405	936,874

1932 from 3,602,427 kw. to 3,689,446 kw. divided over a total of 932 power stations. The increase in the capacity of steam and internal-combustion engined generating stations amounted to approximately 20,175 kw. during the year. At the end of the year 17 new hydro-electric stations with a total capacity of 46,830 hp. were in the course of construction.

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Protest Against San Francisco Plans

Formal objections against the extension of either a grant or loan to San Francisco for the construction of the Red Mountain Bar power house and municipal distribution system have been filed by the Pacific Gas & Electric Company with the Federal Emergency Administration of Public Works. In a formal brief the grounds of the objections are set forth as follows:

1. San Francisco, like all California, is now abundantly supplied with electric power at low rates established by the Railroad Commission. The project for which aid is sought is designed to bring a duplication and wasteful overlap of electric power service into San Francisco, resulting in destructive competition and economic loss.

2. The project for which aid is sought is political in character, highly controversial and framed with a reckless disregard of the city's financial interest.

3. Considerations of national and state economy, of the existing power surplus in California and the impending influx of power from Boulder Dam forbid the giving of aid under the act to any new project for the development or distribution of electric energy anywhere in California.

4. For the reasons stated the city's project will retard instead of advance national recovery, because it will prevent the fullest possible utilization of the present productive capacity of the power industry in San Francisco and, whether considered by itself or in relation to the comprehensive program of public works contemplated by the national industrial recovery act, the project is not economically or socially necessary, convenient or desirable.

The brief points out that in 1927 voters of the city defeated a bond measure to bring power from Moccasin Creek into San Francisco and again in 1930 defeated four proposals regarding construction of a transmission line, erection of the Red Mountain Bar plant and purchase of the distribution systems of the Great Western Power Company and Pacific Gas & Electric Company.

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Westinghouse Payrolls Up

Between $4,000,000 and $5,000,000 a year has been added to Westinghouse Electric & Manufacturing Company payrolls through compliance with the code and the activities of NRA, stockholders have been advised. The statement adds: "It is hoped that these increased expenses will be speedily recovered by increased sales at better prices."

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Nebraska Court Restrains Ainsworth-Diesel Plans

Holding that a municipality is a creature of the law established for special purposes, and that its corporate acts must be authorized by its charter or other applicable laws, the Nebraska Supreme Court has entered an order directing that the city of Ainsworth be permanently enjoined from carrying out a contract with the Fairbanks-Morse Construction Company for the construction of an electric light and power plant (ELECTRICAL WORLD, October 14, page 491). The court finds that where a certain power is conferred upon a municipality and the method of its exercise is prescribed, such methods constitute the measure of the power. It holds that neither express nor implied power to purchase an electric light and power plant and to pay for it by pledges of future net earnings is conferred by the law invoked by the city in this case, which was one of two initiated at the 1930 election by public ownership groups and adopted by the people.

To the contention that there is no distinction to be made between improvement of an existing plant and construction of an entirely new plant and that if there is implied power to do the former, as the court had previously held, there is the same implied power for the construction of a new one, the court says that the laws and facts dispute the conclusion. The action was brought by the Interstate Power Company, which operates a plant at Ainsworth (ELECTRICAL WORLD, August 19, page 228).

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Drumm Battery for Vehicles

Announcement has been made by Dr. I. I. Drumm, the Irish inventor, that his storage battery, so successfully used in railway service for the past two or three years, will be installed in road transportation units. A fleet of vehicles is reported under test.

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New York Metal Prices

	Oct. 31, 1933 Cents per Pound	Nov. 6, 1933 Cents per Pound
Copper, electrolytic	8.25	8.00
Lead, Am. S. & R. price	4.30	4.30
Antimony	6.70	6.70
Nickel ingot	35.00	35.00
Zinc, spot	5.12	4.87
Tin, Straits	48.75	49.75
Aluminum, 99 per cent.	23.30	23.30

Major New Construction This Week

Iowa-Nebraska Light & Power and Iowa Electric Light & Power companies plan new transmission lines in Iowa, totaling about 100 miles, for joint service, with power substation facilities.

Generating units with accessories will be purchased by Essex County (N. J.) Board of Freeholders for power plant at Overbrook Hospital at Verona. Fund of $165,000 being arranged.

Wright & Taylor, Louisville, Ky., plan new distillery. Cost about $400,000.

Sanitary District of Chicago, Ill., plans power plant extensions at Lockport, Ill., including new equipment. An $800,000 project.

Power transformers, heavy-duty motors, hoists, conveyors, etc., will be installed at new Lincolnton, N. C., mill of American Consolidated Tin Mines Corporation. Cost over $250,000.

Muskogee, Okla., plans new city-owned electric light and power plant and distribution system. Cost $1,260,000. Federal loan sought.

Tucson, Ariz., and Salt Water Valley Water Users' Association, Phoenix, Ariz., plan joint construction of new transmission line from Tucson to Eloy, Ariz. Cost about $500,000, with power substations, switching stations, etc., Federal loan sought.

Motors, regulators, pumps, etc., will be installed at Mount Pleasant, Mich., refinery of Roosevelt Oil Company. Cost over $100,000.

Pennsylvania Railroad plans early electrification of lines from near Wilmington, Del., to Washington, D. C.; 132 electric locomotives will be built. Portion of $84,000,000 federal loan, recently secured, will be used for work.

Irish Hills Distillery, Inc., Northville, Mich., to build new $150,000 plant.

Electric Vehicles in Britain

"Notwithstanding that electric vehicles in Great Britain are grossly overtaxed, there is at the present time a boom in electric vehicles, which is proof of advantages which they possess over other forms of road transportation," declared H. P. Dunne, managing director of the International Automobile Show in London. "Business continues to expand and indicates a definite trend toward trade recovery."

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Refrigerator Sales Approach Million

September sales of refrigerators reported as 70,189, according to the Electrical Refrigeration Bureau, exceeded the record of the same month last year by more than 100 per cent and two years ago by 34 per cent. Total sales for the first nine months aggregated 960,569, with prospects therefore of far overshooting the million mark by the end of the year. Total sales in 1931, 948,779, have already been exceeded and those in 1932, 769,983, have been left far in the rear.

As to Rates——

• Philadelphia Electric Company must either assume the burden of proof in its rate case or carry the issue to the Superior Court as the result of a ruling last week by the Dauphin County Court to the effect that injunctions cannot be obtained to interfere with or retard Public Service Commission hearings in rate complaint cases. Asserting that it is without jurisdiction, the court ruled the Superior Court must determine whether the commission has the right to compel the company to assume the burden of establishing proof of $1,000,000 annual reduction in revenue as a result of new rates (ELECTRICAL WORLD, October 14, page 490) and dismissed the company's complaint. Officials of the company have not yet determined whether the burden will be assumed or whether the issue will be carried to the Superior Court for clarification.

• Louisville Gas & Electric Company has made an offer in compromise in settlement of its rate case against the city, whereby the company is willing to accept much lower rates than it sought in the federal court suit, especially for the small consumer. The incoming Board of Aldermen will take under consideration the proposition submitted by the company to settle the pending litigation. Proposed rates were not made public.

• Massachusetts Department of Public Utilities in a general investigation of service charges held in Boston, October 31, in response to a recent Senate order, intimated that the inclusion of overhead costs is essential in domestic rates, however such be formed. W. C. Marshall, Watertown, Mass., charged utility managements with being remiss in not explaining the meaning of service charges more fully to the public, contending that much confusion would be avoided if this were done. Sheldon E. Wardell, for the Massachusetts Gas and Electric Association, defended the clarity and justice of service charges, declaring that the vast majority of customers realize that they are obtaining something in return for the outlay, and asserting that if such charges were wiped out and no compensating changes made in energy prices or other rate details many companies would fall into receiverships.

• New York State Public Service Commission has reported on the reductions in electric, gas and telephone rates ordered for public utilities operating in New York State during the present year. Up to September 1 the commission had either ordered or negotiated for rate reductions aggregating approximately $14,164,799, with many rate cases still pending. Of the reductions so far ordered many will be contested by the utilities. In the commission's report covering 1932, Milo R. Maltbie, chairman, stated that "as an effective means of increasing the use of utility services rate reductions are most important. Increases in rates do not always produce larger net income, and conversely rate reductions often do not produce decreased net income. The latter often stimulate increased use, which use does not increase expenses in fixed charges proportionally, with the result that the net income is increased rather than decreased."

• Indiana Public Service Commission has issued an order deciding that the Public Service Company of Indiana has failed to show cause why its rates should not be reduced. At the same time the commission served notice on the utility that an immediate formal rate case will be instituted and an early hearing held to determine rates for approximately 270 cities and towns in central and southern Indiana served by the company. Action of the commission followed announcement of company representatives that they had nothing further to offer in reply to charges of Sherman Minton, public counselor, that rates are excessive and that earnings exceed a reasonable return. Mr. Minton began the action in June by petitioning the commission to cite the company to show cause why its rates should not be reduced. Perry McCart, chairman of the commission, in addressing the utility representatives, declared the commission to be unanimous in its decision that the company has failed to show cause why its rates should not be reduced. He criticised the recent practice of the utility in submitting "agreed" rate reductions to the commission for approval, although the commission generally approved the agreed rates.

• Wisconsin Power & Light Company was ordered last week to reduce its rates in 300 communities, the reduction amounting to $300,000 annually. One of the outstanding provisions of the order is the requirement for a new type of rate schedule, which, according to the commission, has as its great advantages "its relative simplicity, the ease with which customers may check their bills, the placing of customers on an equal footing and the fact that it approximates closely the cost of serving customers." Under the new schedule a basic charge of 60 cents a month is made against urban residential customers to compensate the company for equipment on customers' premises necessary to provide service, meter inspection, billing and collections. Officials of the utility will decide within a few weeks whether they will ask rehearing on the rate order, which Grover C. Neff, president, declared creates "a serious problem."

• Tennessee Electric Power Company's bills rendered November 10 showed a new electric rate for all commercial customers. New rates will save customers $165,000 over a three-year period, it is estimated. Lowest minimum rate is $2.85. Approximately 15,000 customers are affected.

• Kansas City Power & Light Company has restored free light bulbs. When the Kansas Legislature enacted a law prohibiting public utility companies from engaging in the merchandising business all the companies abandoned the services which they had offered customers. Kansas City Power & Light is said to be the first to resume free lamp service.

• Missouri Power & Light Company officers have been called upon by the Missouri Public Service Commission to confer with it relative to a reduction in rates for gas and electricity. An analysis made by the commission of the company's operations in more than 100 Missouri towns and villages indicated, it is charged, that the company has been earning more than a fair return on its rate-base valuation. D. W. Snyder of Kansas City, Mo., president of the company, was notified by the commission that its investigation indicated the company's earnings were approximately $100,000 in excess of a fair return. The commission has been conducting since 1931 an appraisal and audit of the company's properties to determine its present fair valuation for rate-making purposes.

• Northern Indiana Public Service Company's rate reductions in several towns approved at a recent meeting of the Public Service Commission amount in each case to approximately 10 per cent.

• Northwestern Electric Company on October 27 completed its testimony as to its inventory and valuation at another session in the protracted hearings on the Oregon properties before the state public utilities commissioner. Several witnesses were called to substantiate the voluminous inventory and appraisal prepared for the company by E. C. Willard, consulting engineer. Salient fact in the complex mass of figures gone into in this phase of the hearing is that the company places the reproduction cost new less depreciation plus going concern value of its Portland district property at $13,817,000. This includes allocation to this district of 65.1 per cent of all the jointly used facilities such as power plants, transmission lines and major substations, the other 34.9 per cent being allocated to Washington. This split is based upon the relative peak responsibilities of the two districts. The commissioner's valuation for the Oregon properties is approximately $8,867,000. This figure excludes from the value of the jointly used properties about $600,000 for the Pittock steam station, declared by the commissioner to be no longer useful in the public service, and, further, the commissioner's valuation is

arrived at by splitting the balance of the jointly used property fifty-fifty, which is based on the kilowatt-hours delivered at the substations. The final phase of the hearing, on revenues and expenses, will be resumed in two or three weeks.

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Municipal Items

ANDALUSIA, ALA.—Protest has been entered by the Alabama Utilities Company with the state board of the Public Works Administration against the granting of a loan for a municipal light plant in this city (ELECTRICAL WORLD, November 4, page 580). The utility contends that the city is being adequately served.

JACKSONVILLE, FLA.—City Utilities Commissioner favors the proposed investigation by the City Council into certain alleged irregularities in the operation of the utilities. The local utility is municipally operated.

NEWARK, N. J.—Plans calling for the erection of a municipally owned generating plant and the construction of a complete distribution system for this city have been formulated by Dr. John Bauer, who estimates the capital cost of the entire plant at between $27,000,000 and $35,000,000, with an annual cost of operation of between $6,750,000 and $8,900,000. He has declared that the total unit cost, including generation and distribution, would be between 1.69 cents and 2.22 cents per kilowatt-hour. In contrasting these rates, Dr. Bauer said that the present utility company has an average rate of 4.04 cents per kilowatt-hour. It was estimated by Dr. Bauer that the total annual production would be 450,000,000 kw.-hr. However, he admitted that the sales estimated were higher than those for the Public Service Electric & Gas Company.

CAMDEN, N. J.—A municipal electric power plant could be built at a cost of $8,000,000 and would save the taxpayers from $477,000 to $744,000 annually, according to the findings of Charles S. Leopold, Philadelphia electrical engineer, and Prof. C. D. Fawcett of the Moore School of Electrical Engineering of the University of Pennsylvania, who recently conducted a survey. The engineers made no recommendation as to the advisability of the plan. In figuring the estimated savings, the engineers took into account the outlay for financing the project, for loss of present taxes and for depreciation of equipment. The total cost was taken to include a complete network of power lines throughout the city.

COLUMBUS, OHIO.—Charges that the Columbus Railway, Power & Light Company has protested to federal public works authorities against plans for a $1,000,000 addition to the Columbus municipal light plant in an effort to block a federal grant for that purpose has been declared wholly untrue by B. W. Marr, president of the company. The company has, however, recently issued a booklet regarding electric light and street car service in Columbus, stating that "baiting the utilities" is a political "racket," defending local rate schedules, attacking municipal ownership and declaring that the municipal light plant is selling energy below cost and taxing the public to make up the loss. The company, Mr. Marr said in his statement, merely sent a representative to examine the city's application for federal aid, on an invitation from L. A. Boulay, Ohio administrator for the Federal Public Works Administration. This invitation, he said, was in accordance with the government's policy of notifying private business interests of all public works proposals affecting their businesses. No protest actually has been made by the company. However, "as the largest taxpayer in Columbus," the company "will be well within its rights" if it does protest, Mr. Marr stated. According to an order issued later by Harold L. Ickes, federal public works administrator, the company will not be permitted formally to protest against the federal government giving the city $200,000 to aid its proposed $1,000,000 extension to the municipal plant.

EAST LIVERPOOL, OHIO.—Columbiana County Common Pleas Judge W. F. Lones made permanent an injunction granted to the Ohio Power Company restraining the Board of Elections from submitting a proposition November 7 calling for a bond issue to finance a municipal plant because the petitions failed to comply with the Ohio filing law. People's party leaders indicated that steps would be taken to seek a vote in 1934 on a $998,640 bond issue for that purpose.

CULPEPER, VA.—Virginia Public Service Company has no intention of cutting off the power in this city on and after November 15, the date of the expiration of the town's franchise (ELECTRICAL WORLD, September 30, page 427), according to an announcement made last week by Chairman of the Board of Directors King. "The people need this service, and we will continue to furnish them with it as long as they desire it," Mr. King said. "We regard this as a part of our responsibility."

Public utilities are openly fighting all such proposals as that for a municipal light and power plant at Culpeper, J. G. Holtzclaw, president of Virginia Electric & Power Company, and Floyd W. King, chairman of Virginia Public Service Company, told Governor Pollard last week. They denied that, as had been previously alleged, there was anything "sinister" in the opposition.

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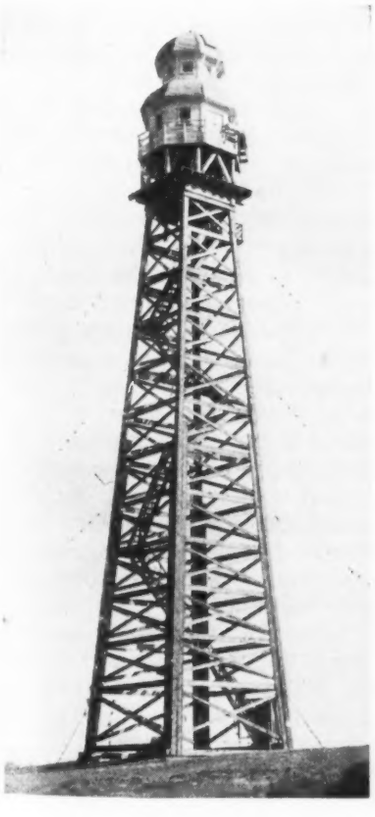
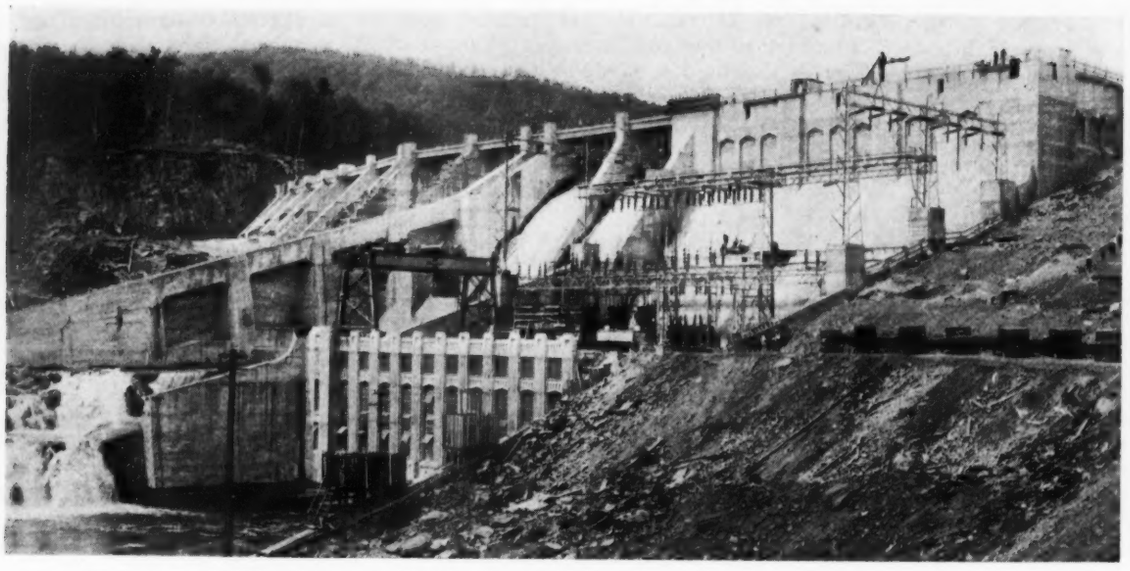
California Climate Aided by "Electrodrome"



This 130-ft. tower erected at Whittier, Calif., by William Haight, inventor, is designed electrically to dispel ground fog and prevent frost. With negative discharges it is claimed that atmospheric moisture may be driven into high cloud areas, thus preventing local formation of frost. Ground fogs are alleged to be capable of local dissipation in a similar manner. In his experiences with the electrodrome, Mr. Haight reports finding from 30 minutes to two hours to be necessary for creating the high, frost-preventing cloud area over a radius of 3 miles from the tower. The record for precipitating fog is two minutes although it has ordinarily taken from eight to twenty minutes over the 3-mile radius affected by the present electrodrome.

The invention is based on the theory that electrical currents flowing between the magnetic poles sway and dip, causing a greater or less flow of energy to the earth at certain points. Such a flow of electrical energy causes clouds, fogs and such forms of condensation of atmospheric moisture. The function of the electrodromes is to create artificially such a condition by means of negative electrical discharges, thus exciting a greater flow of positive energy toward the earth when and where needed.



Wyman Development Arrests Steam Generation

Difficult Hydraulic Problems Solved in Dam Construction

WITH the completion of the initial installation of the Wyman development on the Kennebec River above Bingham, Me., the Central Maine Power Company added so much generating capacity to its system that steam plant production has been unnecessary even with but two units in place at this, the company's largest hydro-electric undertaking. When Wyman was built the total installed capacity of the system was brought up from 100,365 hp. in 23 hydro and two steam plants to a total of 168,365 hp. The development provides for three 24,000-kw. units, and when these are all in service Wyman will virtually double the generating capacity of the system. The ultimate average annual output at Wyman is expected to run around 280,000,000 kw.-hr. The total output of the company's plants in 1932 was 363,779,686 kw.-hr. and, had load conditions required it, about 279,000,000 kw.-hr. could have been produced from hydro, Wyman having available 117,000,000 kw.-hr. of this surplus.

In a recent paper before the Boston Society of Civil Engineers H. K. Fairbanks described various features of the Wyman development which presented problems of interest to hydro-electric designers, and the company has also filed the total cost of the development for two units and hydraulic structures and plant for three with the Maine Public Utilities Commission. This cost, for 53,333 kva., reservoir, dam and plant for 80,000 kva. but without the third unit, totaled $14,423,701, or $270 per kva. No figures were filed for the estimated cost with the plant complete, but it may be anticipated that when this is done the cost will drop to the vicinity of $185 per kva. unless marked changes in price levels occur. References to the Wyman development have been published from time to time in the news columns of ELECTRICAL WORLD, but the engineering features of the installation embody various points of interest which have not been presented in these pages hitherto.

The development is connected with the Gulf Island plant of the company above Lewiston and the Maine Seaboard Paper Company's plant at Bucksport by 110-kv. lines 72 and 67 miles long respectively.

The development utilizes the Kennebec River basin and important lakes in its upper waters, the total drainage area being 2,660 square miles above the dam. The total controlled and usable storage above and exclusive of the dam is 34,000,000,000 cu.ft. The dam forms a reservoir about 12 miles long and 1.5 miles in maximum width, the capacity being 8,500,000,000 cu.ft., about 3,000,000,000 being in the draw-down range.

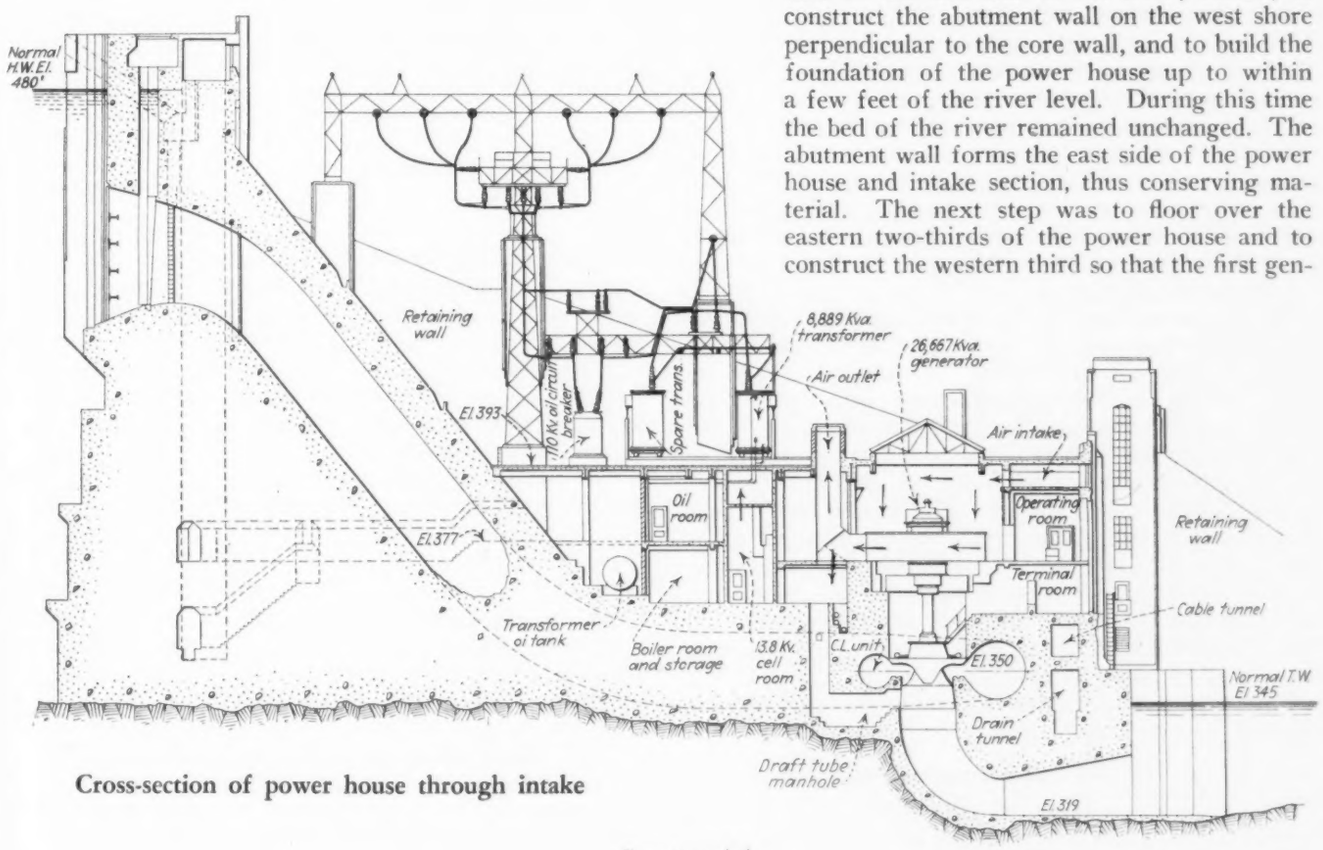
The largest record flood at Bingham is 65,000 c.f.s. (in 1901). The spillway has a discharge capacity of 246,000 c.f.s. with the pond at elevation 495. At elevation 485 the capacity of all openings is 140,000 c.f.s A fall of 135 ft. is concentrated at the plant site, and for some distance above the river flows in a valley from one to one-half mile wide and bordered with hills from 200 to 600 ft. high. Some sites farther up the river offered larger development, but the proximity of Bingham to the transmission system and adjacent rail connections led to the selection of the site chosen. The storage facilities afford a larger potential output at Wyman in relation to installed capacity than in many other cases.

The general layout of the dam includes a non-overflow section of earth 2,400 ft. long, terminating in a concrete retaining wall adjacent to the intake and power house. Between the intake forebay and the west abutment is a 430-ft. spillway of concrete founded on ledge. Earth was selected for the non-overflow section because of the depth of ledge rock below the surface. On account of the pervious nature of the valley floor it was necessary to carry a concrete cut-off wall to the ledge for nearly the entire length of the earth dam. The foundation was sunk to bedrock to insure safety, and this extended down through a gravel bank to a depth of 128 ft. below the level of the river. The gravel bank extended about 1,700 ft. from the end of the dam to the east shore and rose nearly 100 ft. above the river level. The chief construction problem was to lower the dam foundation to bedrock under the gravel bank. The earth dam was provided with a reinforced concrete core wall built by the caisson method under air pressure.

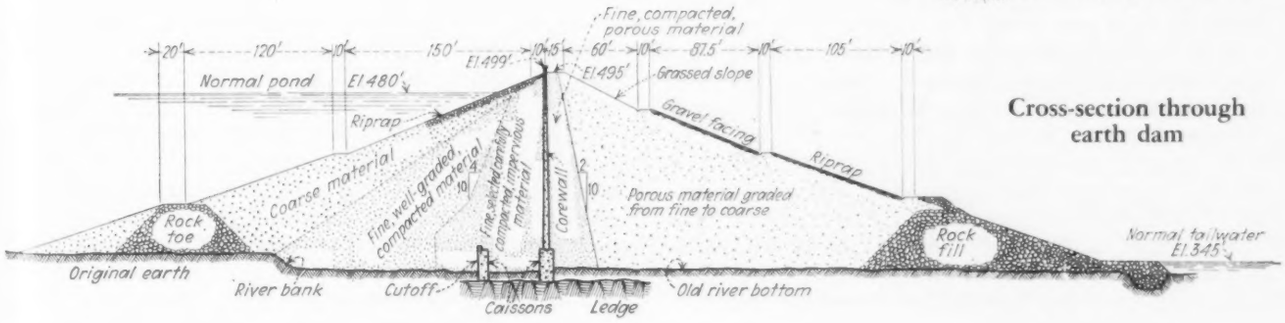
The spillway is a gravity ogee section, with the entire length controlled by crest gates. For normal pond regulation 20x20-ft. electrically operated Broome type gates are used. There are three Tainter gates electrically operated and controlled at the hoists. Electric strip heaters are provided to keep the Broome type gate clear of ice in freezing weather. There are also three bays of stanchion gates carrying 10 ft. of head and occupying a total length of 115 ft. These are designed to trip and be pulled back. Three bays, each 45 ft. in the clear, are provided with stanchion gates carrying 24-ft. head, for emergency use. These are designed to trip and be lost. The top 6 ft. of boards below pond level on all stanchions are in panel form and are equipped with hand-operated hoists. Compressed air pipes are placed along the entire length of the spillway to prevent ice formation, the air being supplied at 20 lb. after being treated to prevent freezing in the pipes. A 6-ton traveling job crane has been installed for handling stop logs, stanchion spindles, etc.

The plant is provided with a log sluice 8 ft. wide for handling the 250,000 cords of pulp and saw logs which are driven down the river each spring and summer. The design provides for sluicing 2,500 cords each 24 hours, using not over 100 c.f.s. as compared with 400 to 800 c.f.s. in many other sluices.

The general plan of construction was first to sink the core wall of the earth dam to bedrock from the line of hills on the east side of the river; second, to construct the abutment wall on the west shore perpendicular to the core wall, and to build the foundation of the power house up to within a few feet of the river level. During this time the bed of the river remained unchanged. The abutment wall forms the east side of the power house and intake section, thus conserving material. The next step was to floor over the eastern two-thirds of the power house and to construct the western third so that the first gen-



Cross-section of power house through intake



Cross-section through earth dam

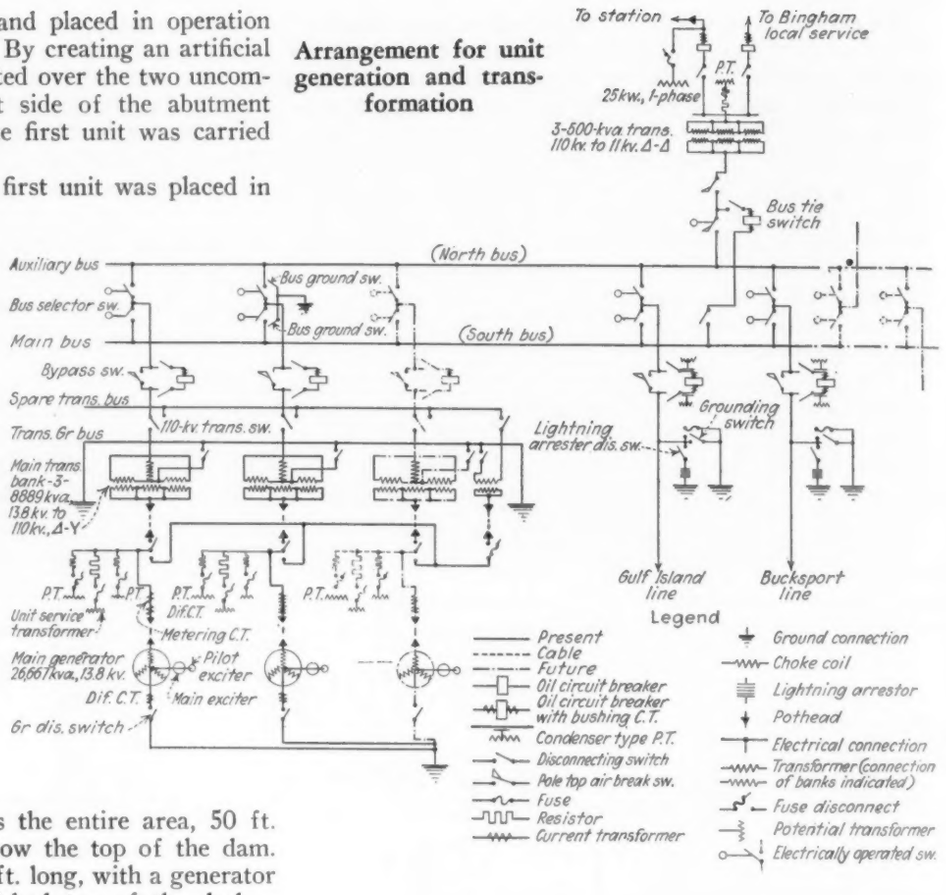
erating unit could be installed and placed in operation before the dam was completed. By creating an artificial channel the river flow was diverted over the two uncompleted waterwheels on the west side of the abutment wall while the completion of the first unit was carried forward.

By resorting to this plan the first unit was placed in operation over four months ahead of schedule. Through arrangements with other owners on the Kennebec water was drawn from Moosehead Lake in order to fill the storage above the dam, thus permitting early operation of the first unit. This water was sufficient to last about 3½ months, when the station was shut down pending the regular spring run-off,, but during the initial period of operation 29,600,000 kw.-hr. was generated.

By integrating the power house construction with the intake section of the dam and utilizing the abutment walls as intimated the customary superstructure was not required. A concrete deck covers the entire area, 50 ft. above the river and 100 ft. below the top of the dam. The power house proper is 155 ft. long, with a generator room 35 ft. wide. On the finished top of the deck a removable glass hatchway, octagonal in shape and providing a clear opening of 21 ft. 6 in., is located over each unit. A service hatch 10 ft. square is also provided. On the downstream side of the building is a control room 14 ft. 6 in. wide x 103 ft. long.

A two-leg outdoor gantry crane with two electric hoists, each of 62½ tons capacity and having a 49-ft. 7-in. span, travels the length of the power house and serves all the hatches and erection space on the roof. Rail and highway connections were brought under the crane to facilitate unloading. The use of a two-hook crane enabled the units to be designed with one-piece shafts instead of being split between generator and wheel, and also reduced the height and cost of the building. The interior of the generator room is served by an 8-ton crane capable of handling all small parts of the units. Virtually all necessary maintenance work can be done without lifting the roof hatches.

Arrangement for unit generation and transformation



Intakes and generating units

The waterway entrance to each turbine unit is flaring with a central dividing pier. Each half of each waterway is controlled by a gate 11 ft. 1 in. wide x 22 ft. high. At a point 22 ft. beyond the gates the passages converge to a circular section 16 ft. in diameter. Between this point and the scroll cases the penstocks are each uniform in section and steel-lined. Each headgate, of the caterpillar type, is operated by a stationary motor-driven cable hoist of 65 tons capacity, remote-controlled from the switchboard. The hoists are equipped with limit switches and indicating lamps on the board. As the hoists are located in a chamber protected from the weather, service reliability is increased and maintenance lessened. The scroll cases are drained by 24-in. pipes through an unwatering pump. The bottoms of the scrolls are 3 ft. below normal tailwater level, and provision is made for applying compressed air to hold the water down during inspection and repairs. Stop-log guides are provided in the tailrace piers to allow unwatering the draft tubes. Parts that are cast in concrete are ready for the third unit, in the intake and power house sections.

The generating units each consist of an Allis-Chalmers 34,000-hp. Francis type waterwheel operating under a net head of 135 ft. and at 138.5 r.p.m. and driving a 26,667-kva., 90 per cent power-factor, 13,800-volt General Electric generator. All the governor equipment is located in the basement away from cold air. The generators are of the umbrella type with compressed spring thrust bearings below the rotors and only one guide bearing each. The rotor may be removed to give access to the windings without disturbing the thrust bearing, and a damaged bearing part can be replaced by lifting the rotating parts about ¾ in. The main exciter and pilot exciter are located on top of the machine on a main shaft extension. Ventilation is by cold air taken in through the top and discharged through a space within the stator frame to a duct leading to the power house roof. A damper and second exit are provided so that hot air can be discharged into the basement and recirculated in severe weather. Instead of the usual ventilating duct around the stator the duct is placed within the latter between the outside frame and core. To allow more air area near the exit the frame is set on a slight eccentricity.

To insure stability when connected to present or future transmission systems generators were designed with low transient reactance, large WR^2, damper windings, quick-

response excitation and high-speed automatic voltage regulation. To permit use of one generator to charge a long transmission line the short-circuit ratio was made somewhat higher than usual. No auxiliary or house generators were provided, each unit furnishing all the energy required for its operation. Station service energy is taken from a bank of transformers on the 110-kv. bus.

Low-tension switching virtually omitted

In order to save space the switchboard was installed flush with the control room wall, access to its rear being from the generator room. Between the power house and the dam is a space in which are located 13.8-kv. cell rooms, a storage battery room, transformer oil cooler, air compressors, oil storage, machine shop and spare parts storage. The only low-tension switching is the disconnecting switch installation in the cell room for transferring a spare transformer to any generating unit. The generator leads are tapped here to supply power to various auxiliaries. All transformers and oil circuit breakers, including unit service and station service equipment, are placed outdoors.

The wiring scheme includes one circuit breaker for each bank of transformers and one for each line, plus a bus-tie breaker. Each breaker has an air-break bypass switch and isolating disconnects. Two buses are provided and each breaker is connected to these through motor-operated selector disconnecting switches. These selectors are mutually interlocked and also with the breakers. so that it is impossible to operate them in the wrong sequence.

Each unit has its own bank of Westinghouse transformers (three 8,889 kva. per bank), delivering energy at 115 kv. to the outgoing lines. Forced oil cooling was used on account of the limited space available. The heated oil from the transformers is pumped through Griscom water coolers supplied by gravity from the reservoir. The transformers are connected delta on the low side and star-neutral grounded on the high. Circuit breakers are Westinghouse Deion type, with a rated interrupting capacity at full voltage of 1,500,000 kva. Each breaker is equipped with bushing type transformers for relaying, the line breakers having additional current transformers for ammeter service and bushing-type potential devices for relaying, synchronizing, voltmeters and power-factor meters. The rated opening time from trip-coil energization to arc rupture is 12 cycles.

The lightning arresters are of Westinghouse make and are rated at 121 kv. with solidly grounded neutral. Fused ground gaps are installed as a back-up. These are designed to permit replacing the fuses at any time without killing the line or removing any equipment from service. A second set of fused gaps was located near the transformers on the main bus and four ground wires per circuit are carried about ¾ mile from the station as additional protection.

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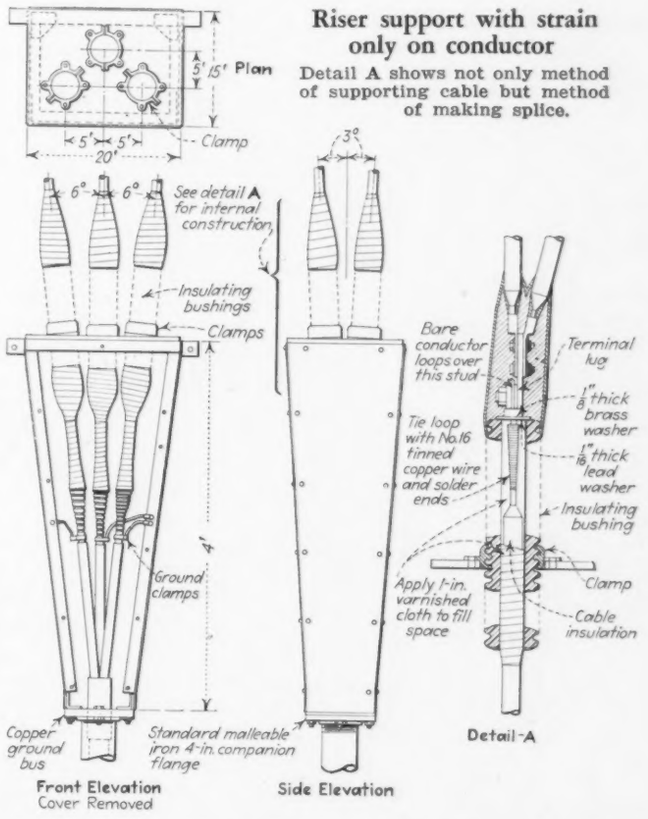
Riser Support Without Cable Grip

By W. W. WISHARD
Field Engineer Industrial Substations, Commonwealth Edison Company, Chicago

Cable risers for 12-kv. supply to the substations in the vertical secondary network in the new Field Building, Chicago, are supported in a way that confines tension stresses to the cable conductors alone and does it without friction grips or hangers of any kind. The cables—three No. 1/0 rubber covered, shielded under a single outer braid—are contained in a 4-in. conduit which is supported as in ordinary vertical pipe construction. A malleable pipe flange is screwed on the end of the conduit above the substation floor level and on this flange is mounted an inverted pyramidal structure of angle iron and sheet metal which is, in effect, an air-insulated cable bell. In the top of this bell are set three porcelain bushings, held by clamps about their middles, and through which the cables are drawn. The bare cable conductor passes up through the hole in the square turned end of a special lug, is looped around the stud on the lug flange, then returned through the hole in the end and served back and soldered on itself under a layer of binding wire. With brass and lead washers under it, the square turned end of the lug rests on the end of the porcelain bushing. The weight of the cable imposes a compression stress on the bushing and through it to the frame of the structure to the flange on the end of the 4-in. conduit. The entire riser structure, including conduit, cables and terminal arrangement, thus is a rigid unit of self-contained stresses so installed and supported. The details of the riser head are apparent in the accompanying drawings.

Riser support with strain only on conductor

Detail A shows not only method of supporting cable but method of making splice.



Compact Portable 300-Kv. Testing Set

Portable test equipment affording d.c. potentials up to 300 kv. has recently been purchased by a South American utility to test 75,000-volt oil-insulated cable that links Buenos Aires and La Plata. The equipment is divided between two four-wheel automobile trailers, so that the petrol-engine-driven, low-tension generator and accessories which occupy one trailer do not have to be conveyed to places where other low-tension supply is available. The test potential of 300 kv. is obtained from two rectifying tubes connected in series and energized, as shown in Fig. 1, by a 150-kv. transformer.

The core of the transformer is inclosed in a porcelain tank, so it is only necessary to insulate the terminals for 150 kv. Inclosed in the tank are also the small transformers for heating the cathodes of the rectifying tubes. The weight of the combined transformers is about 1,000 kg. and the longitudinal space occupied is only 170 cm. Oil-insulated condensers, also insulated for 150 kv., are supported on porcelain post insulations. An adjustable gap, composed of spheres 25 cm. in diameter, measures the test potential, which is adjusted by the regulating transformer indicated in Fig. 2. Remote indication of the gap separation is given in tenths of a millimeter.

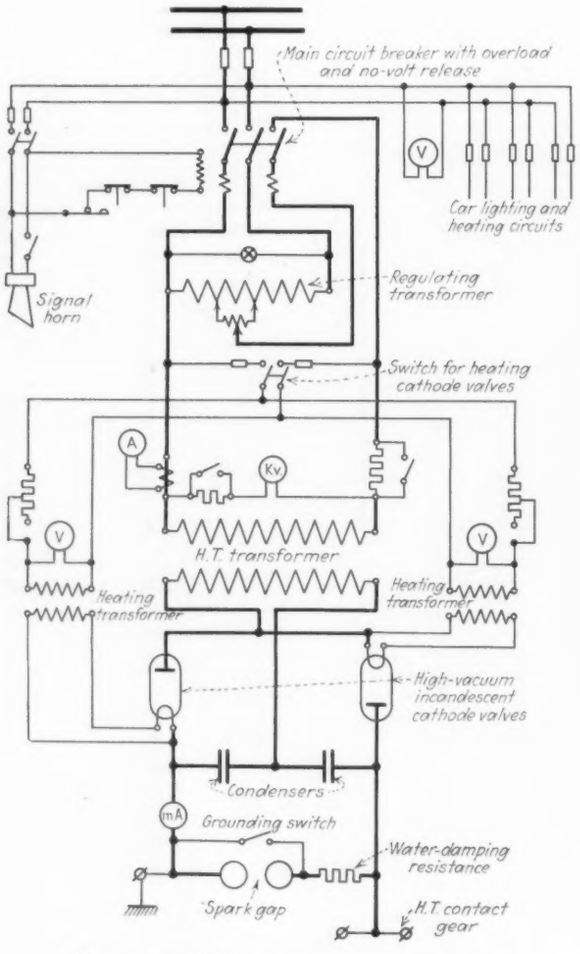


Fig. 2—Wiring arrangement of 300-kv. cable-testing car

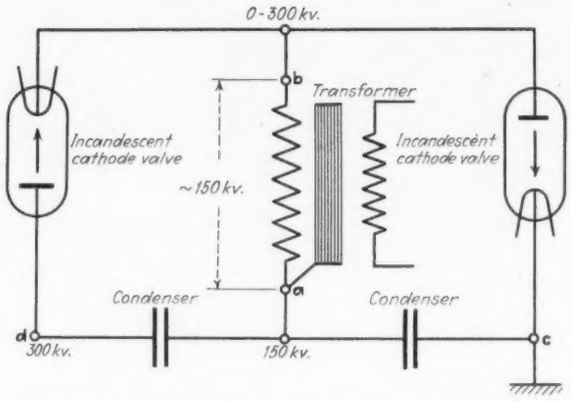


Fig. 1—Circuit for producing 300-kv. direct current

When a test is to be made the hinged porcelain leads, shown in Fig. 3, are swung into a horizontal position so they protrude through the narrow panels in the side of the car and make contact with a spring contact on the condensers. By means of the remotely actuated grounding switch, which makes contact with the shaft of the upper sphere of the gap, the cable under test may be ground and discharged through a water-damping resistance. It consists of two glass tubes (120 cm. long by 6 cm. diameter) filled with distilled water and carried on the side of the car when not in use.

All control is centralized in a separate compartment. The equipment was furnished by Siemens & Halske and the foregoing information contributed by Oliver P. Van Steewen of Berlin.

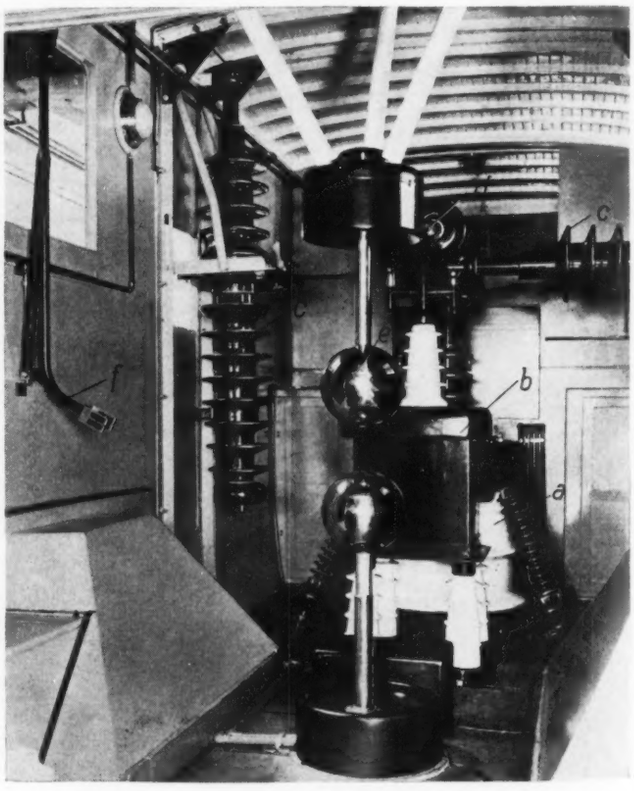


Fig. 3—Compact arrangement of 300-kv. test equipment

(a) high-tension transformer; (b) condenser; (c) hinged leads for external connection; (d) water-damping resistance; (e) remote-control and remote-indicating spark gap; (f) remote-operated grounding switch.

Active Merchandising Beneficial

By GEORGE S. WILLIAMS

Vice-President and General Manager
Central Maine Power Company

Utilities should lead in community load building.

Policies should be changed to meet new conditions.

Suggestions for action.

WITH the present industrial program rapidly becoming effective there is going to be more cash available in the hands of customers than they have had for several years and there is a general tendency to spend this money to provide comfort and convenience in the homes. Therefore, I am strongly convinced that the electrical industry should change and improve its merchandising practices and seek to obtain its share of this business by selling all lines of electrical merchandise. I consider the merchandising policies of the utility properties as very vital to the development of their business in the future. The time has arrived for selling dump and surplus power as well as load factor power to commercial and domestic users. This will result in a saving to the customers and will benefit the utilities very materially.

In my opinion there is an immediate opportunity to apply four major merchandising policies in a concentrated effort to develop more business rapidly and economically. These major projects are:

1. Rental of electric ranges.
2. Rental of electric refrigerators, plus a liberal free trial offer to purchasers.
3. A flat rate for a certain class of water heating customers who cannot afford the present large tank automatic storage type of continuous service.
4. More salesmen, greater compensation for salesmen, more competent salesmen, distinctive type of truck and equipment for salesmen and a sales school for obtaining and training salesmen.

A fuller explanation of these policies is warranted and, necessarily, the conditions encountered in Maine are used as a basis for such a contemplated program and for the analysis back of the program:

1. *Rental of Electric Range*—(a) A large percentage of people want electric ranges; the most serious handicap is the initial cost, which is difficult to meet in face of today's large obligations of most people—paying $100 to $200 for an electric range plus cost of energy is too burdensome.

(b) Many people who really can afford to buy on the installment basis are fearful of this. Yet people have no objection to "rental buying."

(c) There need be no fear of dealer relations. A rental plan of ranges, working with a mutual plan whereby the dealer may rent also, would increase both his sales and those of the utility many-fold. It would greatly increase wiring for contractors, which should result in considerable activity on their part to push rentals.

(d) The return on the money invested would be a splendid investment. For instance, suppose a range cost the utility approximately $100; this includes initial cost, wiring, small commission, interest, etc. On a six-year rental plan, at the rate of $1.50 per month, the utility would receive back in six years practically the cost of the range. The revenue to the utility over the six years should approximate about $240; figuring that 75 per cent of this would be net, that means $180. Supposing service and repairs in that time ran about $25. These figures, taking rental of $108 plus increased net earnings of $180 less the cost of service, leave about $260 over the six years. One year would return $43, which is about 40 per cent of the original investment of around $100.

(e) The objection raised to this plan is that after two or three years the range may become obsolete and the customer will want a new range. While this will happen, of course, in cases, it seems to me that the range could be relet at about 50 cents a month, or some such figure, to a customer who would be willing to pay this in preference to taking a new range at $1.50 a month. This might tend to open up another market for people desiring higher priced ranges, and who probably can well afford it. I would suggest a higher rental rate in case they did desire to rent a more expensive range.

(f) The above plan would require each operating company to have at some central location a complete renovating shop for these rental appliances. In order to cut down the losses due to exchange on the part of the customer or lack of proper care of the appliances in the home each company should be set up with competent men and equipment to take these rental appliances in and thoroughly repair, renovate, refinish and place in A-1 condition to return upon a rental basis to further rental prospects. Otherwise there might be a tremendous charge-off in appliances unfit for use.

Another objection is that if it is to be a rental proposition people would not take good care of the range. The thing to stress in all these rentals is *ultimate ownership*, and I believe that after a customer has paid rental three or four years he certainly looks forward to completing the payments and actually owning the range.

It seems to me that any investment which shows a return of approximately 40 per cent is worth considering, especially when it is considered that it is the easiest way possible to get the electric range in the home. That, to my mind, is what we are after.

2. *Electric Refrigerators*—A rental plan is just as workable for an electric refrigerator as the range and should work out almost as profitably. I believe that home trial of refrigerators should be pushed much more extensively than is now permitted. This would mean considerable increase in inventory, but I firmly believe results would warrant it. It has proved so with the electric washer. Once it is in the home it usually remains. The fellow who sells the automobile today is the fellow who gets you in his car and has you drive it. The same plan should work with the free trial offer of electric refrigerators.

3. *Water Heaters*—I believe that a large market for electric

While not in effect on the Central Maine Power Company system, the policies outlined in this article by Mr. Williams represent the consolidation of his ideas together with those of his associates, George O. Smith, commercial manager, and Alton Littlefield, publicity manager. The ideas have been developed by past experiences in Maine and are suggested as constructive ways to develop the domestic market—EDITORS.

hot water heating would be opened if a fixed flat price could be quoted for furnishing a hot water service to the person who cannot quite afford the present cost of the 50-gal. automatic storage type continuous service installations. These are now averaging $5 per month in this territory.

Any new policy on water heating should be entirely an *off-peak proposition* and ought to be a flat price, not exceeding $3 per month, for all the hot water a customer wished to use off-peak. A "booster" might be arranged to care for any emergency when hot water would be desired at other times, this booster connected to the regular appliance meter which would be at a higher rate. With our present water heater policy practically 80 per cent of the installations have a separate meter.

Quite frequently utility companies make large investments in electric steam boilers or special substations for the sale of off-peak or surplus power. The same amount of money invested in water heaters with free rental in the home would create a tremendous return at a very much higher price per kilowatt-hour to the utility. Forty thousand dollars would purchase 400 heaters, which would pay, on an average, $4.50 per heater per month, or $18,000 a year.

The objection I hear to this plan is that people can't pay their bills now and if we burden them more we will have more delinquent accounts. In the first place, I believe the delinquent account situation is temporary. Secondly, people are now paying for a hot water service some way or other and are rapidly turning to oil, and if we don't get this business soon it will be more difficult to acquire it later.

4. *Salesmen and Compensation*—At certain periods, at least, I believe we could use many more salesmen, paying a higher salary to attract real salesmen. I believe that we should have a traveling crew of two or three men with a leader, who could be used to good advantage in places where salesmen now do not have time to reach.

I believe that the utility should provide salesmen with a delivery truck, or some such vehicle, on which larger merchandise could be taken around with the salesmen, leaving appliances on demonstration. Under a plan of making a salesman stand his own traveling expenses, sometimes he is not interested in following up a lead in some distant town in his territory, because even though he would make the sale his commission would practically be eaten up by his cost of traveling.

We must realize that our salesmen do an exceedingly large amount of good-will work and selling which reacts to sales being made by other dealers. This is fine and we should encourage it and expect to pay the salesman for some of this work, which actually doesn't show up on his sales records.

I believe salesmen should get a better commission on rentals than at present, and when, as and if a sale is actually made later he should get an additional bonus. This would tend to keep a salesman always interested in the rental prospect and follow up his final sale.

In order to obtain the large force of competent salesmen necessary to put over a major sales promotion program it would almost seem necessary to provide some form of school so as to weed out those who were incompetent rather than to continue on our present policy of taking on men for two or three months' trial and then finding that they just cannot obtain the desired results. I believe this school should be so organized that only picked men are permitted to take the course; that some of the time and expense should be borne by the individual, the utility to stand the balance; examinations to be required and only salesmen of a certain caliber be permitted to go out and contact customers, representing the electrical industry. This may be a little in advance of present merchandising plans, but I believe it is the only possible way to equip our customers' homes with the right type of merchandise and have it installed on such a basis that it will not create a burden on top of their monthly bill for electric service.

In summing up the above merchandising policies, that I believe should be instituted, all of these plans involve the tying up of a considerable amount of cash. But if the merchandise rental plans are properly applied there can be a very fine return on the investment without any question.

It is a good plan to have the engineers draw up curves to show the required amount of cash that must be available to handle a certain estimated sale of ranges, refrigerators and water heaters over a period of two years, this curve to be so designed as to show the cash tied up on a rental or on a partial-payment basis on the sale of one, two, three or five thousand units per year. It would also show the increased cash required for ample inventories to handle a major program of this kind and show how, after a period of one year, the return on rentals would partly offset the cash required for the new installations over the second period of one year.

The new-business development account, of course, would increase, which is chargeable directly to operating expenses when there is free installation of ranges, refrigerators and water heaters. It is my idea that this cost should be charged into a suspense account and distributed evenly over a period of possibly five years against new business, which would be largely offset after the program got into proper swing by the increase in domestic gross earnings.

Service department essential

I also believe that in connection with a major merchandise plan of this kind the development of a properly organized service department should not be overlooked. It will be necessary to have a large number of thoroughly trained service men competent to handle all kinds of electric service and adjustment of appliances in the home. We should not try to specialize too much by having refrigerator men, range men or oil burner men, but should have trained men capable of handling service or repairs on all of these appliances. This would call for very competent instructions, possibly in the form of schools, to make certain that these men know their job before we send them out to our customers in answer to service calls. I feel that the service we give on the equipment which we now have on our lines has a great bearing on the sale of additional appliances in the future. Utilities should develop the highest type of men in a service department that they know how to produce, with the sole purpose of building up confidence in the minds of prospective customers that with electrical appliances they are assured of the best possible service.

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Preparing for Opportune Time

It is generally recognized that the best opportunity to shut down an isolated generating plant comes at the time when a material additional investment or replacement is required. "It is part of the responsibility of power sales organizations to keep in close contact with industries operating generating plants," says H. C. Thuerk, Utility Management Corporation, "so that when this time arrives they shall have obtained sufficient knowledge of the method of operation and costs of these plants that they shall be in a position to demonstrate intelligently and effectively to the industrial plant executives the wisdom of turning the responsibility for power supply over to the utility company. The time to begin this preliminary work is now rather than at the time the opportunity arrives."

Protecting Squirrel-Cage Winding of Synchronous Motors

By M. N. HALBERG

Industrial Engineering Department,
General Electric Company

When operating in synchronism, the squirrel-cage or amortisseur winding of a synchronous motor does not carry any current and hence requires no protection. However, when operating out of synchronism, for example, during the starting period, a heavy current flows in this winding. If such operation is unduly prolonged overheating and failure of the winding will eventually occur. Prolonged operation out of synchronism may result from a failure to start, unduly long accelerating period or pull-out on an overload or voltage dip and failure to resynchronize. Since these operating conditions may occur on any application, it is essential that the control equipment give adequate protection to the squirrel-cage as well as to the stator winding* of the motor.

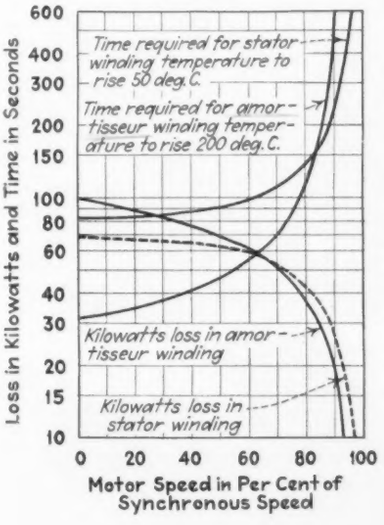
When delivering a given torque the heat loss in the squirrel-cage winding of a synchronous motor is directly proportional to the slip speed at which it is operating. Hence the motor can operate only a short time at low motor speeds, or stalled, but can operate for a considerable length of time at high speeds as far as overheating of the squirrel-cage winding is concerned. For example, a typical motor might be stalled on the line for only fifteen seconds without danger of overheating the squirrel-cage winding, but it might run indefinitely at 95 per cent speed without overheating this winding. Hence any device used to protect the squirrel-cage winding against prolonged operation out of synchronism should allow operation for a length of time depending upon the motor speed, the shortest operating time being allowed with the motor stalled.

At low speed the squirrel-cage winding heats up much more rapidly than does the stator winding, while near synchronous speed and, of course, in synchronism, the stator winding will overheat before the squirrel-cage winding does. This is illustrated by Fig. 1, which applies to a particular synchronous motor during the starting period. Although this motor was especially designed with a very heavy amortisseur winding for severe accelerating duty, at standstill this winding will reach a dangerous temperature in about one-third of the time required for the stator winding to reach a dangerous temperature.

Thus if the stator overload relay is designed to follow the heating curve of the stator winding, it will not adequately protect the squirrel-cage winding. On the other hand, if the stator overload relay is designed to protect the squirrel-cage winding at all speeds, it will overprotect considerably the stator winding and thus unnecessarily limit the operation of the motor in synchronism.

To take care of this situation there has been recently developed a special relay (Fig. 2) the sole function of which is to protect the squirrel-cage winding. Near synchronous speed the slip-frequency and the impedance of the relay reactor are low, so that a small proportion of the current passes through the relay heater element. On the other hand, at standstill the slip-frequency and the impedance of the reactor are high, so that most of the current passes through the heater element. This results in a relay whose tripping time is a function of the motor speed. By proportioning the reactor coil and the heater element properly, a relay is obtained which follows the heating curve of the squirrel-cage winding and which will trip the motor off the line before this winding overheats, regardless of whether the motor is stalled or operating at any sub-synchronous speed.

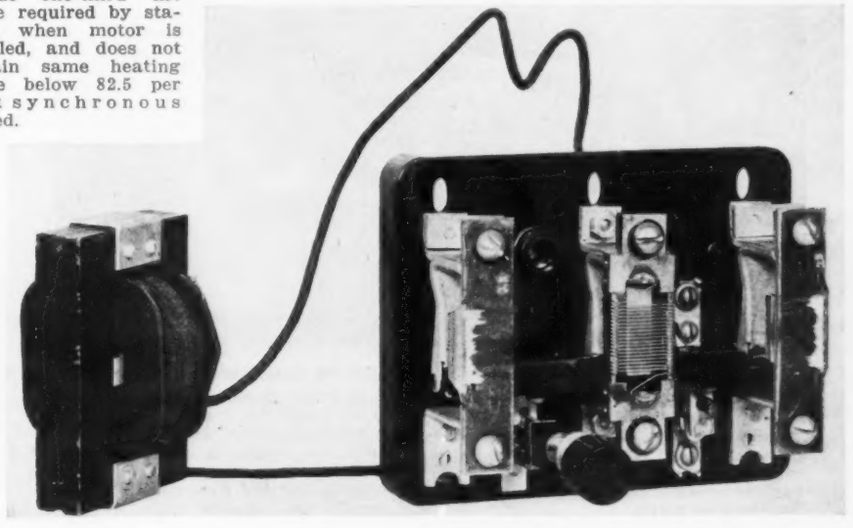
Fig. 1—Relative heating of amortisseur and stator windings at sub-synchronous speeds



This applies to a 200-hp., 0.8-power factor, 275-r.p.m. synchronous motor. A higher temperature is allowed for the squirrel-cage winding than the stator winding because the former is not adjacent to insulation. Note in this case that amortisseur reaches permissible temperature in about one-third the time required by stator, when motor is stalled, and does not attain same heating time below 82.5 per cent synchronous speed.

Fig. 2—Relay protects squirrel-cage winding

Consists of a single-element temperature relay connected in field discharge circuit in parallel with small reactor. Whenever motor operates out of synchronism, induced field current flows through relay heater and reactor. Division of current between relay and reactor depends on slip frequency and, hence, motor speed.



**Temperature overload relays, as commonly provided on all synchronous motor controllers, will, if properly designed, adequately protect the stator winding from overload, undervoltage, loss of excitation or prolonged operation out of synchronism.*

Selling Outdoor Lighting by Demonstration

By G. K. HARDACRE*
Public Service Company of Northern Illinois, Chicago

USE OF portable demonstration equipment to show prospects how their premises will appear when lighted up has been very effective in selling floodlighting. While the lighting engineer should concentrate his efforts on live prospects, he should endeavor to offer trial installations to every outdoor lighting prospect, large or small, the entire length of each street and highway in his territory, whether or not the prospect is on the mailing list.

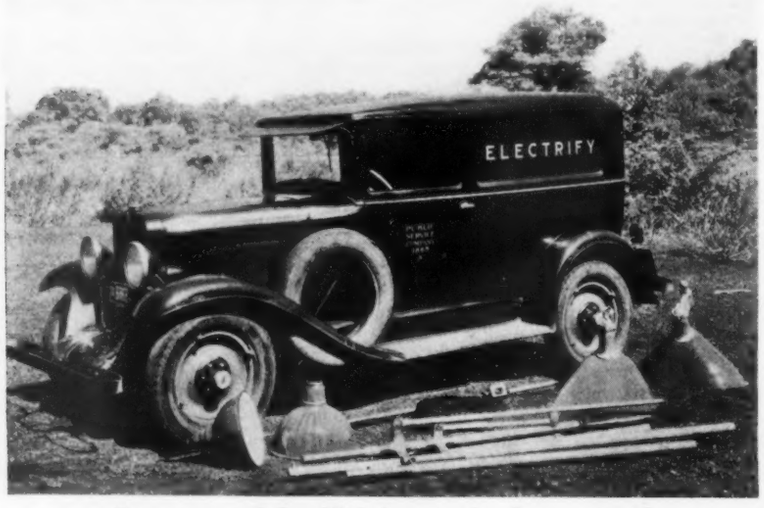
Good outdoor lighting not only attracts trade but keeps it. Often adequate lighting at night is one of the most important requirements for a successful business. It ranks in importance right along with good location, efficient equipment, quality products and cleanliness. The well-illuminated place of business stands out from its surroundings and gives the prospective customer the idea that here is a live, wide-awake business conducted by a live, wide-awake business man. Night-time lighting increases day-time sales.

Recently a large service station in Chicago desiring valuable data on floodlighting carried on an experiment with the following results: For three days this station was operated without using its lighting system of six 1,000-watt floodlights. It had little business during this "dark era," while the station across the street got almost all the night trade. But when the lights were turned on again gasoline sales jumped from 100 to 600 gallons a day, while oil sales increased from 6 to 35 qt. a day. Where 21 cars were serviced daily without the use of floodlights, an even 100 came in the day after they were put in use. Once there were as many as eleven cars

From paper before Lighting Service Conference, Lake Delavan, Wis.

This demonstration assembly cost $10

The pole, which can be easily separated into three sections for transportation, has been mounted on the running board and lighting unit is being pulled up.



Four types of floodlighting can be demonstrated

Portable equipment for any sort of roadside lighting demonstration is available to lighting engineers at all times. (Lamp rack, not shown, cuts down unnecessary breakage.) If none of four combinations gives effect applicable to the prospect's needs, a special demonstration is arranged using inclosed projectors or other equipment. Tripod arrangement makes effective comparisons between ordinary lighting (or no lighting, as the case may be) and floodlighted way.

Some Results Obtained from Demonstrating Lighting

Company A—Suburban and Small Towns—4½ Mo. (Ten Lighting Engineers)

Number of new outdoor lighting installations (five portable demonstrations used)	582
Contracted load	1,236
Estimated increased kilowatt-hours	1,849,000
Estimated annual revenue	$80,000
Of which one manufacturer kept the following detailed record of his equipment sold (representing only a part of total):	
Number of units sold, utility direct sales	248
Number of units sold by electrical contractors through efforts of lighting engineers	270
Total units sold	518
Total connected load for 518 units, kw	447
Total retail value of units sold	$8,172

Company B—Suburban Areas—30 days (partial results)

Mailing lists	322
Number of inquiries from direct mail	28
Number of night time demonstrations (one Ford car)	15
Number of sales	13
Load added, kw	17.9
Additional active prospects	15

Company C—Small Towns—30 days

Number of mailings	1,450
Cards returned	51
Calls	499
Prospects	...
Number	74
Load, kw	104
Kilowatt-hours	148,353
Earnings	$8,756
Sales—	
Number	40
Load, kw	80
Kilowatt-hours	105,900
Earnings	$5,962

Company D—Medium-Sized City—30 days

Number of letters (2 to each prospect)	944
Number of replies	4
Number of prospects received from employees	35
Number of calls made	600
Number of calls which improved customers' relations	16
Number of night time demonstrations made (two telescopic sets)	76
Number of kilowatts added	33.85
Estimated annual kilowatt-hours	37,969
Estimated annual revenue	$1,930

Company E—Small Towns—May 15, 1933, to July 15, 1933

Number of installations (demonstrations, three contractors and one manufacturer's truck)	118
Gain in kilowatts connected	267.1
Estimated annual increased kilowatt-hours	188,915
Estimated annual increased revenue	$11,558

Company F—Suburban and Small Towns—three months (Ten Lighting Engineers)

Installations sold (five demonstration assemblies)	132
Estimated kilowatts added	255
Estimated increased annual revenue	$9,665
Estimated increased annual revenue per installation	$73

Company G—Medium-Sized City—May 1, 1933, to July 1, 1933

Number of letters mailed	480
Recommendations submitted	78
Number of prospects	146
Number of sales (demonstrations, one coupe)	24
Estimated annual increased revenue	$1,445
Estimated annual increased kilowatt-hours	25,885

Company H—Large City—September, 1932, to July 1, 1933

Number of written specifications	194
Number of these carried out to date	64
Resulting connected load, kw	490.9
Number of verbal recommendations carried out	95
Resulting connected load, kw	166.5
Total connected load, kw	657.4
Estimated yearly revenue	$29,583
Cost of publicity activity	$918

Company I—Large City—December 10, 1932, to April 27, 1933

Number of night time demonstrations (one tripod arrangement)	66
Number of floodlighting units sold	128
Connected load, kw	132
Number of skyscrapers lighted or relighted (trial installations)	2
Number of floodlighting units sold	214
Connected load, kw	261

Any kind of outdoor lighting demonstration

Masts rest on the bed of the truck and are raised from the platform, where various fixtures can be interchanged. Masts can be adjusted to an approximate mounting height of 25 feet.

waiting for washing service. Floodlighting increased daylight sales 500 per cent.

Many convenient and handy schemes for demonstrating and "sampling" the possibilities of floodlighting have been developed, some without going to the trouble and expense of equipping a truck or automobile with standard large size projectors. The simplest collapsible equipment consists of a 1,500-watt open-type lighting unit held 25 ft. in the air by means of four sections of 1-in. conduit pipe coupled together and only involves extending brewery cord to the nearest existing outlet. This equipment, being separable into five parts, is easily transportable from one location to another, allowing three or four effective demonstrations per evening. One lighting engineer recorded 23 sales out of 25 demonstrations made with it.

Only a few hundred dollars is needed to equip several lighting engineers operating in widely scattered sections with these effective demonstration sets. The low investment makes it possible to retain the demonstration sets for winter sports and other seasonal loads throughout the entire year.

Trucks equipped with a variety of projectors are more costly. Furthermore, the truck must be taken out of other service and devoted exclusively to lighting demonstrations for the period of its use. When too great a variety of projectors is displayed, customers often become confused, thereby slowing up the sales negotiations and the acceptance of the lighting engineer's lighting and wiring recommendations. However, where great versatility is needed the demonstration truck can be used to advantage, and it has justified its use in a large number of cases. On the whole, demonstrations have sold approximately 60 per cent of the prospects called upon.

Results to contractors

No activity has brought the contractor into the selling part of lighting operations more actively than have the recent outdoor lighting programs conducted throughout the United States. Maybe he has been intrigued by the night-time demonstrations, which appeal as tangibly to his sense of values as they have to the customers'. Or perhaps it has been brought about by the fact that the person making the original contact, particularly in the case of a demonstration, must know not alone the prices on the equipment, but also the prices on poles, setting of poles, cost of wiring, and, in general, be able to give the

customer a very close approximation of how much the installation is going to cost. This has made it necessary to have very close co-operation with the contractor, because unless an effort is made to close the sale within 48 hours after the demonstration, it has been found that not much good accrues from the demonstration. There is little doubt that the demonstrations have had no small part in getting the contractors' whole-hearted support. This is evidenced by the fact that many contractors now have their own demonstration assemblies and trucks.

The success of contractors employing demonstration methods in the merchandising of outdoor lighting and wiring has proved that selling lighting by demonstration is basically sound and should be extensively employed in other fields of lighting as well.

Those utilities whose reports have been considered in compiling this paper have placed no dollars and cents value upon the volume of business done by contractors, but it undoubtedly has been a large portion of their businesses within the past few years, when there has been little or no new building.

If the same effort, enthusiasm and methods of demonstrating and selling lighting were applied to other fields of lighting the results should be equally gratifying.

Results to central stations

The records of the 1933 outdoor lighting activities conducted by the 36 central stations whose reports have been used to compile this paper show a surprisingly high return for the efforts expended.

A study of these reports indicates that the following approximate average results may be expected from aggressive efforts to develop outdoor lighting in suburban areas and small communities:

Estimated average number of all commercial customers that are immediate outdoor lighting prospects, per cent	1 to 2
Estimated average number of night-time demonstrations resulting in sales, per cent	60 to 75
Estimated average increased load per sale, kw	1½ to 2½
Estimated average annual revenue increase per kw	$65 to $80
Estimated average annual revenue increase per sale	75 to 100
Estimated average increased annual revenue per dollar sales expense	2.50
Estimated average value of floodlighting fixtures sold	35.00

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Springfield Network to Return Costs Inside of Four Years

THAT the installation of a proposed network system in the downtown area of Springfield, Mass., now in the initial stages, will achieve economies sufficient to carry the new investment in four to five years and save $25,000 net in three more years was recently developed by the United Electric Light Company of that city at a hearing before the Massachusetts Department of Public Utilities.

There is an area of 0.929 square mile in the most congested part of the business district to which electricity for all purposes is supplied from the State Street generating station by twenty-two 2,300-volt, single-phase feeders, seven 5,500-volt, two-phase, four-wire circuits and fourteen series street lighting circuits. These circuits consist of some 100 underground cables leading from State Street station to various points in the area and necessarily occupying a large amount of duct space in the streets. In many of these streets it would be impracticable materially to increase the number of underground conduits, and yet the electrical load is continually growing and additional cables are being needed from time to time in all parts of this area.

Decision to network area follows long study

The United company recognized that continued operation with the present system of distribution downtown would lead sooner or later to the point where all the ducts in many of the streets will be full of cables and there will be no room for additional ducts. This point would have been reached before now in several places downtown had business in the city maintained its growth at the 1926-29 rate. The company pointed out that the longer the network installation is delayed the greater will be the cost of substituting it for the present system. By 1940 the duct situation would reach a stage where the network could not be installed without first installing a new duct line system, and the cost would be enormous.

About three years ago an exhaustive study of the company's distribution system was started with a view to determining the best future method of providing for growth without materially increasing the number of conduits, at the same time reducing the distribution losses if possible and also cutting down the investment per kilowatt of load in this part of the system. The decision to adopt the network results from more than two years of analysis.

The existing system is of the radial type, started in Springfield many years ago, long before the low-voltage network system had been developed and when the load density was far below that necessary to justify the use of a network, had such a thing been known.

The network system to be used will include comparatively large transformer banks (300 kva. prevailing size) located in vaults and fed directly by 13,200-volt cables. These banks will be connected in multiple to a 120-208-volt four-wire grid supplying the customers, eliminating the usual varied sizes of distribution transformers, medium voltage switching and feeder regulators in substations and reducing feeder losses and operating costs. The area in question has a load density varying at present from 3,000 kva. to 40,000 kva. per square mile, and as this density is expected to double within ten years, the whole area will soon be beyond the density wherein the old system is economically justified.

The average investment per square mile required for the two systems for load densities of 10,000 to 80,000 kva. is shown in Table I.

The 0.929-square mile area which is to be served by the network has been divided into five sections of vary-

Table I—Relative Investments of Radial and Network Systems

Load Density per Sq. Mile in Kva.	Investment in Present Radial System per Sq. Mile	Investment in Network System per Sq. Mile
10,000	$1,250,000	$ 900,000
20,000	2,200,000	1,320,000
40,000	3,800,000	2,000,000
80,000	5,960,000	2,900,000

Table II—Present and Future Division of Load Densities in Downtown Springfield

Area	Sq. Miles	Load Density per Sq. Mile, Kw. Present	1943
A	0.2	40,000	80,000
B	0.083	5,700	11,300
C	0.28	4,300	8,600
E	0.22	9,830	19,700
F	0.146	2,900	5,800
	0.929		

Table III—Comparative Investment of Radial System and Network for Downtown Springfield

Year	Peak Load Kva.	Investment Radial System	Investment Network System
1933	12,200	$1,375,600	.....
1934	13,000	1,444,500	$ 696,100
1935	13,960	1,509,200	951,400
1936	14,980	1,592,500	1,024,200
1937	16,000	1,672,800	1,057,000
1938	17,200	1,763,700	1,092,600
1939	18,300	1,842,500	1,122,800
1940	19,800	1,958,200	1,165,600
1941	21,200	2,064,000	1,199,000
1942	22,700	2,179,800	1,235,600
1943	24,300	2,303,700	1,267,800

ing load density and size, present and future, as given in Table II.

The network will be installed one section at a time, taking the most congested district first. The total present load in this area is about 13,000 kva.

Table III shows a comparison of the investment costs for the two distribution systems applied to this downtown Springfield area with varying total loads as they may be expected to occur in future and indicates the great advantage gained by the proposed low-voltage network in reduced costs as the load grows from its present value to double that amount.

To complete the network in the area under consideration will require new investment of approximately $1,400,000 and will bring about the retirement of property which will reduce the company's retirement reserve by $1,500,000. Notwithstanding this, the system will carry itself and yield a profit in the comparatively short time mentioned above.

At the hearing the company was asked whether the proposed replacement of so-called obsolete equipment by the network would be attended by reduction of energy losses, decreased maintenance charges and lessened depreciation. It replied that transformer and feeder losses will be diminished and maintenance and depreciation costs reduced. The engineers of the United company expect to realize a saving of 40 per cent in losses occurring in this area. It was pointed out that it is impossible to express the benefit to be expected in reduced maintenance charge and depreciation in per cent, but stated that when it is realized that about 100 miles of underground cable has been in use downtown at various potentials from 2,300 to 7,500 volts for periods of from five to 25 years and will be replaced by new modern cable operating at 208 volts, it is certain that repairs and renewals will be less for many years. Therefore renewals, retirements and depreciation will be less.

The average life of the present cable system to be replaced is about twenty years. The life of the new equipment and cable required by the network has not been determined by experience, as the first system of this kind went into service in 1922, but a conservative estimate of thirty to forty years may be relied upon, the commission was informed. As has been pointed out elsewhere, an important advantage of the system is that no part of it can become obsolete on account of increasing load, as it can be expanded indefinitely for increased load by adding more cables and transformer units.

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How Cut Down Cost of Fuse Outages?

The expense entailed by blowing of fuses is often overlooked in industrial plants and may attain amounts which are quite out of proportion to the cost of fuse replacement alone. For example, the machine shop of the Railway & Industrial Engineering Company, Greensburg, Pa., revealed an annual expense of $3,224 due to blown fuses, of which 80 per cent was due to idle machines and men. The results of the analysis are shown in the accompanying table.

The shop has a connected load of 500 hp. with 60 motors ranging from ¼ to 50 hp. driving machine tools. Some are driven by individual motors, others in groups of two to six by single large motors.

This experience, which may be common to many plants, suggests the necessity of one of four remedies or preventives: Some practical procedure for preventing overloads; some maintenance system for expediting fuse replacement; limitation of machines dependent on same fuse; or substitution of circuit breakers which can be reclosed by operators without waiting for maintenance men.

What Blowing of Fuses Cost One Plant

Fuse Cost		
Average number fuses blown per week	20	
Average replacement cost per fuse	$ 0.60	
Total fuse cost per week	12.00	
Total fuse cost per year	624.00	$624.00
Lost Machine-Hour Cost		
Average number fuses blown per week	20	
Average replacement time per blown fuse (hours)	⅓	
Total time lost per week (hours)	6⅔	
Average number machines idle per blown fuse	3	
Total machinery time lost per week (hours)	20	
Total machinery time lost per year (hours)	1,040	
Value of average machinery-hour rate	$ 1.00	
Total value lost machinery hours per year	1,040.00	$1,040.00
Lost Man-Hour Cost		
Average number fuses blown per week	20	
Average replacement time per blown fuse (hour)	⅓	
Total time lost per week (hours)	6⅔	
Average number men idle per blown fuse	3	
Total man-time lost per week (hours)	20	
Total man-hours lost per year (hours)	1,040	
Value of average man-hour rate	$ 1.50	
Total value lost man-hours per year	1,560.00	$1,560.00
Total loss per year		$3,224.00

Standardizing Transformer Handling

DISTRIBUTION transformer handling has recently been co-ordinated on all operating properties of the New England Power Association system by establishing a routine procedure and record system which controls inventory, saves time in making changes and in installation, preserves engineering data for ready reference and facilitates centralizing information regarding transformer investments, ratings and spares available for intercompany service. For the purposes of this standard aerial and underground transformers under 10 kv. and under 300 kva. are classed as of the distribution type.

The central information point on transformer units with respect to storage and handling is a transformer record clerk on each local property. When a transformer is received from a manufacturer or another company the stores department makes out the routine "material received report" with carbon copy for the foregoing record clerk. This shows all nameplate data and the manufacturer's serial number. Space is left for listing company badge numbers. The stores department uncrates the transformer and attaches the "distribution transformer tag" (reproduced herewith), after filling out section "B" of the tag. When the badge number is assigned it is entered on the tag, applied to the unit and listed on the material received report. The transformer is then placed in or near the testing room.

Inspection and testing of "purchased" transformers

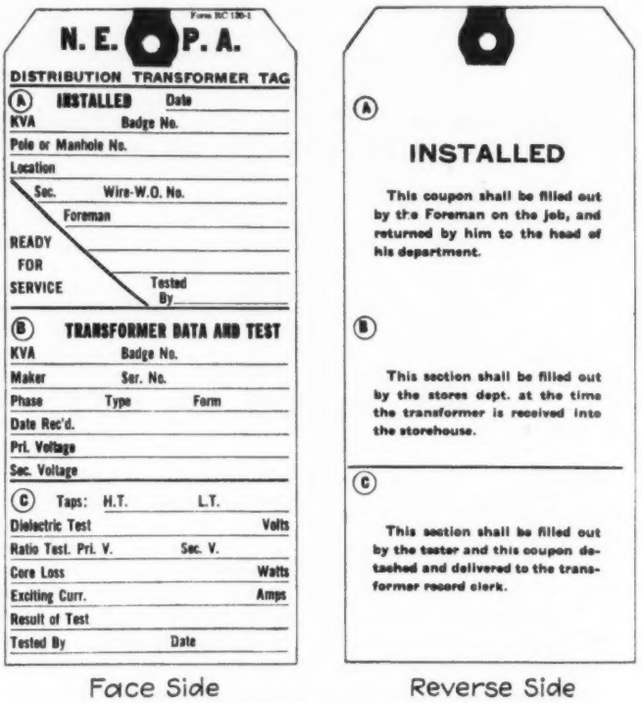
Purchased transformers are inspected visually. If defects appear the superintendent determines the need of further tests. If no defects are found the transformer is filled with clean, dry oil and a high-potential dielectric acceptance test is made. Voltage ratio, core loss, exciting current and secondary balance tests are made when required.

Subway transformers are given a 7.5-lb. air test to locate possible leaks in gaskets, joints or tank.

If the transformer is ready for service the tester initials the space provided in "A" on the distribution transformer tag. The test findings are recorded on part "C" and delivered to the record clerk. In case the transformer has failed in any of the acceptance tests the tester cuts off the triangle bearing the words "Ready for Service" from the tag, initials and indicates the nature of the failure. The coupon "B" also is sent to the record clerk, but part "A" of the tag remains attached to the transformer, which is then turned over to the stores department.

Receiving and tagging "returned" transformers

When a transformer is removed from service on a local property and returned to its storehouse it is accompanied by a "material returned to stores" ticket made out in triplicate. This gives the street name and pole or manhole number from which the transformer was removed and kva. voltages, badge number and manufacturer's number. All three copies of this ticket are turned in to the stores department and one copy is delivered to the transformer record clerk. The stores department attaches a "distribution transformer tag" after filling out part "B" and entering the badge number in "A." Testing follows, with visual inspection, drainage of old oil and cleaning of core and coils if badly sludged. Any necessary repairs within the scope of the tester are made, such as replacing bushings and leads. Repairs outside his scope are


N. E. P. A.
DISTRIBUTION TRANSFORMER TAG
A INSTALLED Date
KVA Badge No.
Pole or Manhole No.
Location
Sec. Wire-W.O. No.
Foreman
READY FOR SERVICE
Tested By
B TRANSFORMER DATA AND TEST
KVA Badge No.
Maker Ser. No.
Phase Type Form
Date Rec'd.
Pri. Voltage
Sec. Voltage
C Taps: H.T. L.T.
Dielectric Test Volts
Ratio Test. Pri. V. Sec. V.
Core Loss Watts
Exciting Curr. Amps
Result of Test
Tested By Date
A
INSTALLED
This coupon shall be filled out by the Foreman on the job, and returned by him to the head of his department.
B
This section shall be filled out by the stores dept. at the time the transformer is received into the storehouse.
C
This section shall be filled out by the tester and this coupon detached and delivered to the transformer record clerk.

Face Side Reverse Side

Coupon tags simplify transformer handling

made at centralized maintenance points (Lowell, Worcester or Fall River). Defective leads are replaced only with leads made up by the manufacturer. Rewound transformers are given all the tests applied to purchased units. The tester fills out part "C" of the tag and in "A" indicates the conditions of the transformer as follows:

1. If ready for service the space provided is merely initialed.

2. If the transformer is condemned the tester cuts off the corner as before, initials and records the reason for condemning, such as "obsolete," "burned out," or "rewind."

The coupons "B" and "C" of the tag are forwarded to the transformer record clerk, part "A" remaining attached to the unit. If the case needs repainting or restenciling it is done on order of the superintendent, and the unit is then turned over to stores.

Storage Practice—Transformers ready for service are carefully segregated from all others. They are removed from stock on a material-issued ticket bearing the work order number, kva. and voltage ratings. The stores clerk adds the badge number; the stores department keeps two copies and forwards one to the record clerk. No values

are allowed to be placed on the ticket, since all transformers, whether in service or in stock, are on one account. Part "A" of the tag remains attached to the unit when it is turned over to the line crew. Upon installation, the crew foreman fills in the balance and turns "A" over to the head of his department, who forwards it to the transformer record clerk.

Oil Inspection and Storage—The standards recommended that each company or adjacent group secure an oil filter and portable oil testing outfit for reclamation purposes unless the oil is burned or extremely viscous. Oil is filtered until a test of 22 kv. between 1-in. disks at 0.1 in. separation or equivalent is obtained. Oil stored outdoors or otherwise unsatisfactory must be sampled and tested before use. It is assumed that oil stored indoors in suitable airtight containers will be satisfactory for use without further test for one year, but no oil is approved under 18-kv. test breakdown.

The association requires field inspection of distribution transformers at not more than five-year intervals. Distribution transformer records are kept on 5 x 8 in. cards classified under: "In service," "Awaiting test or repairs," and "Ready for service or in stock." This checks units going out without routine inspection. The data and test coupons (parts "B" and "C" of the tag) are filed by badge numbers. The number of distribution transformers carried in stock for service is controlled by a local standardization committee, and in general the local storekeeper is held responsible for initiating purchase requisitions when the number ready for service reaches the minimum.

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How a Manufacturer Views Isolated Plants

Multiple-line manufacturers are more inclined to look at the proposal of an isolated plant strictly on its merits and not from the standpoint of the immediate sale of equipment. They have a profound recognition that the business of the utility is the production and distribution of power and that the power companies, therefore, should logically be the suppliers to practically all industrials.

Without going into details or a technical discussion of the merits of the isolated plants vs. central-station power, the conclusions I would draw from such studies as I have made and investigations by others, with particular reference to loads up to 1,000 kw. and neglecting cases of justifiable heat balance, are:

1. That those central stations whose power rates compare favorably with average power rates in the United States should run into very little competition that is economically justified.
2. That those central stations whose power rates are low as compared with the average should run into no justifiable competition whatsoever.
3. That those power companies whose rates are higher than the average will have to rely more on the advantages of central-station service to retain their load.

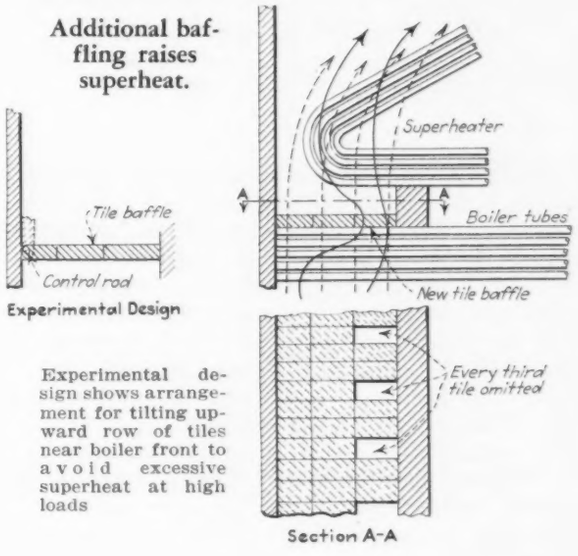
The reference to low, average and high is, roughly speaking, and on the assumption of average load factors, in the order of 1 cent, 2½ cents and 2 cents per kilowatt-hour respectively.

F. W. SHACKELFORD,
General Electric Company,
before Pennsylvania Electric Association.

Spending Money to Save Money

Expenditure of about $3,000 for revised superheater baffling in the Crawford Avenue station of the Commonwealth Edison Company is saving ten times that amount in a year. Formerly there was unrestricted upward flow of gases at the superheater ends as indicated by the dotted arrows in the sketch. A certain portion of the gas volume passed between the boiler headers and the end of the superheater without contacting the superheater tubes at all.

It was conceived that an increase in turbine efficiency would result if all of the combustion gases could be made to pass through the end of the superheater, which would result in higher superheat. This was done by



Experimental design shows arrangement for tilting upward row of tiles near boiler front to avoid excessive superheat at high loads

installing a tile baffle as shown in the sketch. Every third tile was omitted in the inside row. Thus all the gases were made to flow through the superheater and at an increase over their former velocity. The first boiler so treated showed a gratifying increase in steam temperature and accordingly the same revision was made in all the boilers in the station. Tests have proved that the new baffling causes an average rise of superheat from 215 deg. to 235 deg., a gain of 9.3 per cent, which in terms of turbine operation for the station means a saving in coal cost of $30,000 per year under present load conditions.

After the baffling was installed a certain difficulty arose due to the fact that at high boiler loads the increase of superheat was too great. To control this factor an experimental arrangement is being tried out in one of the boilers. The first row of tiles is arranged to be tilted upward by means of a transverse rod across and inside the boiler front as shown in the detail in the sketch. By this means part of the gases is allowed to follow its former path at times of high load and the superheat is somewhat reduced.

Fig. 1 — Projection welded angle tested to destruction

This 1¼x1¼x⅜-in. angle welded at each end to ¾-in. plate failed when pulled at speed of ¼ in. per minute at 24,800 lb. just outside the weld. As indicated by Table I twenty tests with four combinations of angles and plate produced failure in the angles without shearing the welds.

Shear Strength of Resistance Welds

By GROVER A. HUGHES

Chief Electrical Engineer
Truscon Steel Company, Youngstown, Ohio

INFORMATION on the shear strength of resistance welds was requested at a past annual meeting of the American Welding Society, and it was surprising to learn how little was known on the subject. Still, resistance welding is the most popular form—strongest, most uniform and reliable. It shows its greatest economy where the articles to be fabricated are uniform, as in the automobile industry. Joists, columns and light trusses have been fabricated with great success since 1915. The strength of the welds is known to the fabricator, yet it is true that structural engineers do not have sufficient data at hand to enable them to design structural member connections by resistance welding.

The results of some tests made by this company are presented here, but it will be shown that the popular method of determining the area of welds after failure with a planimeter leads to errors. A method which avoids this error is presented. The tests deal entirely with structural steel and structural members and are divided into three classes—projection welding, spot welding and flash or butt welding.

Results of tests on projection welded joints in which the weld was subjected to shear are presented in Table I. It will be observed that the angle and not the weld failed in all cases. No attempt was made to measure the area of the welds. It was merely desired to see if the weld in shear would develop the maximum strength of the angle. Comparison of the results in Tables I and II indicate that, despite precautions, the eccentric loading during the test was undoubtedly responsible for the difference between average values obtained for the welded joints and angles alone.

Tests of the welded joint between the chord and web in a Truscon bar joist are presented in Table III. Again the welds were stronger than the web. To determine the shear strength of such welds the method of test illustrated in Fig. 3 was employed. After failure, the area of the welds was measured by a planimeter, but their elliptical form and distortion made it difficult to obtain the exact area.

In one case three men obtained as many different answers—0.34 sq.in., 0.38 sq.in. and 0.4 sq.in. The force necessary to shear the weld of ½-in. round rod from the chord member to which it was welded was 26,080 lb. Using this value and the area 0.34 sq.in., the shear value of the weld amounted to 76,700 lb. per square inch. Using the area 0.4 sq.in. the shear value was 65,200 lb. The ultimate tensile strength of the ½-in. round in this test was 64,800 lb. per square inch.

This test indicated that one of three conditions existed: (1) Error in obtaining weld area by planimeter reading; (2) friction between compression member and tool; (3) weld metal stronger than parent metal.

One fact stood out. The welds were stronger than the web members. That was our goal. We had reached our objective. However, we did not know the shear value of the weld metal. Larger sections with nearly 1 sq.in of weld area were subjected to similar tests, but the shear values obtained varied from 48,730 to 63,000 lb. per square inch.

The method of determining the shear values of welds was abandoned in favor of the method illustrated in Fig. 4. Ten test specimens involving ¼x2-in. plates

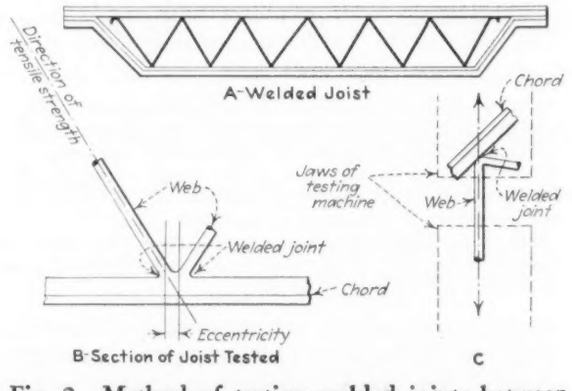


Fig. 2—Method of testing welded joints between web and channel of truss

The section of the truss tested was placed in jaws of testing machine so web was in tension. Table III shows fifteen tests in which web failed without rupturing weld.

and ten composed of ⅜x2-in. plates were tested at a speed of ⅛ in. per minute. The failure of the ¼-in. specimens took place in the middle member. The spot welds did not shear. The lowest test failed at 31,350 lb., or 62,700 lb. per square inch; the highest failed at 32,750 lb., or 65,500 lb. per square inch—a difference of 2,750 lb. between the high and low maximum tensile strength of ten tests, or a difference of 5 per cent.

Results of the tests on the ⅜x2-in. specimens are presented in Table IV. The lowest shear value obtained for the welds was 36,600 lb. per square inch and the highest 58,100 lb. This discrepancy again is believed to be due to error in measuring the weld areas with a planimeter and because of elongation of the welds in failure.

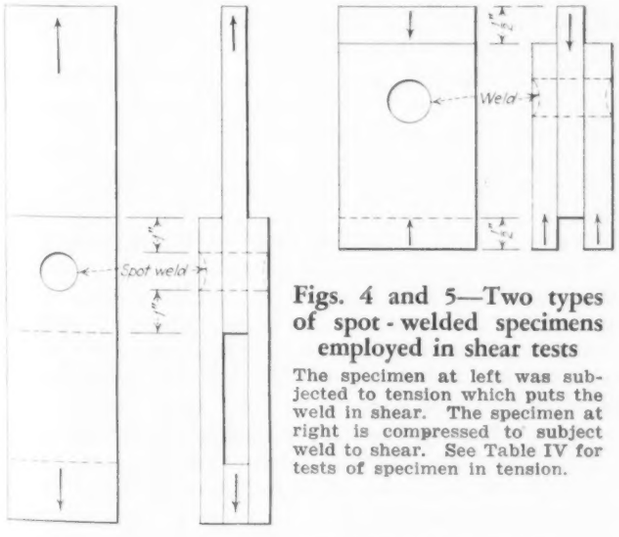
Tests were next made on the same material, using the method illustrated in Fig. 5. Ten specimens of each size (¼x2-in. and ⅜x2-in.) were prepared. Nine of the ¼x2-in. specimens failed by buckling the central plate. One failed by shearing of the weld between the central plate and one outside plate, the weld pulling from the center piece in the form of a cone ¾ in. in diameter. The other side plate buckled. All the ⅜-in. specimens failed by shearing the weld between the central plate and one outside plate. The beam reading at the time of failure of one specimen was 56,000 lb. and the weld area was about $\frac{1}{16}$ in. diameter.

Up to this time hundreds of tests had been made without obtaining the information sought. We knew the shear or tension value of a weld in pounds on any given thickness of steel if the diameter of the electrode, pressure, time of welding and kilowatt capacity of welder were given. But the initial area of the weld could not be determined after failure with a planimeter.

In order to obtain accurate shear data it was necessary to know the size of the welds before testing. Such tests would require time and considerable outlay of money. Fred P. McBerty, president of the Federal Machine & Welder Company, was approached and agreed to do all the machine work of tools for testing and to weld and machine the specimens.

Two series of tests were decided upon: (1) On structural steel near the lower limit of 55,000 lb. per square inch (tensile) with approximately 0.15 per cent carbon; (2) on structural steel near the upper limit of 65,000 lb. per square inch (tensile) with about 0.30 per cent carbon.

Each series would include: (a) Tensile and shear



Figs. 4 and 5—Two types of spot-welded specimens employed in shear tests

The specimen at left was subjected to tension which puts the weld in shear. The specimen at right is compressed to subject weld to shear. See Table IV for tests of specimen in tension.

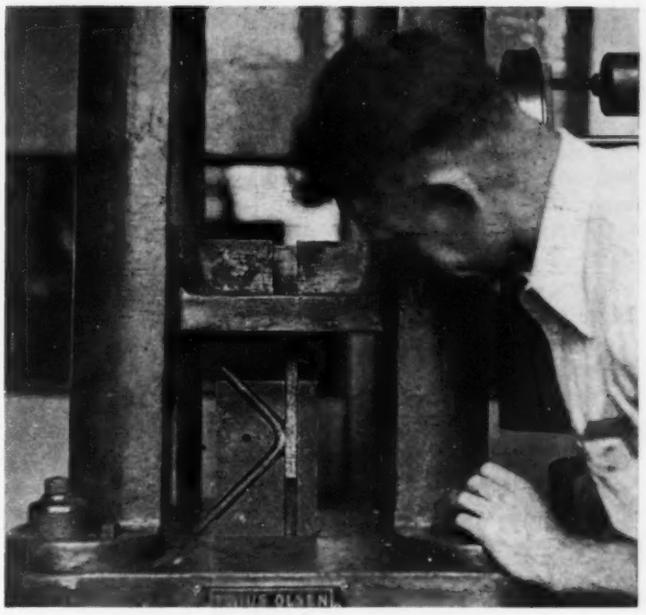


Fig. 3—Testing shear of weld in bar joist

The test pieces were dipped in heavy cup grease to eliminate friction between compression member and specimen holder.

Table I—Strength of Projection-Welded Joints With Weld in Shear

For nature of welds tested see Fig. 1, which indicates a test piece after failure. The end of the angle tore just outside the weld. All failures in this set of tests occurred in the angle. The test specimens were pulled at a speed of ¼ in. per minute until failure. Welds were so located in leg of angle as to minimize eccentric loading.

Angle	Plate	No. of Tests	Tension (Lb.) at Failure—Highest	Lowest	Average	Failure
1½x1½x¼	¼	5	14,200	12,300	13,600	Angle
1½x1½x5/16	¼	5	24,800	21,300	22,930	Angle
1½x1½x5/16	5/16	5	25,630	22,280	23,810	Angle
1½x1½x5/16	⅜	5	26,430	23,500	24,940	Angle

Table II—Ultimate Tensile Strength of Angles Used in Tests

Compare with Table I

Angle	No. of Tests	Tension (Lb.) at Failure—Highest	Lowest	Average
1½x1½x¼	3	19,300	17,750	18,730
1½x1½x5/16	3	28,250	26,600	27,350
1½x1½x5/16	3	31,400	30,300	30,800
1½x1½x5/16	3	32,250	31,600	31,910

Table III—Strength of Welded Joints Between Web and Chord in Truscon Bar Joist

The joints were subjected to tension in the direction of the web member to simulate practical conditions (see Fig. 2). All failures occurred in web just beyond weld.

Web	No. of Tests	Ultimate Strength (Lb.)—High	Low	Average	Failure
⅜ Round	5	19,020	18,200	18,730	Web
5/16 Round	5	9,190	9,120	9,140	Web
⅜ Round	5	8,200	7,750	7,880	Web

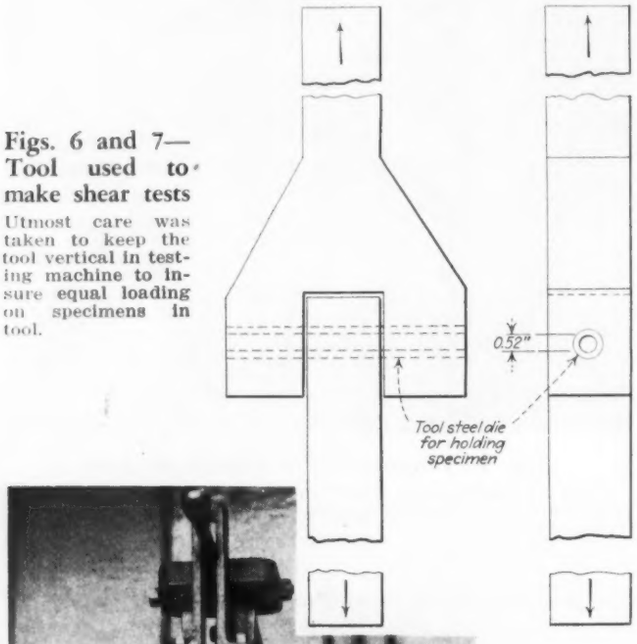
Table IV—Shear Value of Spot Welds Between Interleaved Plates

The assembly tested is illustrated in Fig. 4 and involved ⅜x2-in. plates. Pulling speed ⅛ in. per minute.

Test. No.	Failure	Beam Reading (Lb.)	Area* of Welds (Sq. In.)	Shear per Sq. In. Weld (Lb.)
1	Spot	46,300	1.1	42,900
2	Steel	46,250	....	.....
3	Spot	43,300	.8	58,100
4	Spot	32,500	.75	43,300
5	Spot	36,800	.95	38,700
6	Spot	45,600	1.15	41,600
7	Spot	37,100	.85	43,600
8	Spot	44,000	1.2	36,600
9	Steel	46,530	....	.....
10	Steel	47,120	....	.....

*Measured by planimeter after failure.

strength of parent metal; (b) shear value of spot welds; (c) tensile and shear strength of flash welds. Structural grade bars 1¼ in. square were ordered. For tensile tests of steel bars the specimens were turned to 1-in. diameter. For shearing tests the specimens were turned to ½ in. diameter and tested two at a time with the tool shown in Fig. 6. The spot-welded and butt-welded specimens were etched after turning to this diameter so they could be accurately located in the testing tool.



Figs. 6 and 7—Tool used to make shear tests

Utmost care was taken to keep the tool vertical in testing machine to insure equal loading on specimens in tool.

Automatic flash welders and spot welders made by the Federal company were used to make specimens to insure uniformity in welding. The time, current and pressure used in welding were constant and beyond the control of the operator.

Results of the tests are presented in Table V. The information offers material for thought and careful study. We give it as it is. It speaks for itself.

Table V—Tests Comparing Strength of Flash and Spot Welds With Parent Metal

Welds made on Federal automatic machines. Shear specimens turned down to fit die in tool (Fig. 6). Accurate position of weld assured by etching specimen after turning.

Test Specimen	Stress	No. of Tests	Pounds per Sq. In. High	Low	Average
Carbon, 0.16; Manganese, 0.51; Phosphorus, 0.016; Sulphur, 0.035					
Parent metal	Tensile	5	61,880	61,200	61,740
Parent metal	Shear	5	50,170	48,700	49,350
Flash weld	Shear	10	49,890	47,630	48,580
Flash weld	Tensile	10	61,010	57,090	59,120
Spot weld	Shear	10	48,980	47,080	47,801
Carbon, 0.33; Manganese, 0.35; Phosphorus, 0.007; Sulphur, 0.04					
Parent metal	Tensile	5	69,700	68,430	69,270
Parent metal	Shear	5	55,930	54,760	55,240
Flash weld	Shear	10	55,600	53,480	54,900
Flash weld	Tensile	10	69,380	67,450	68,810
Spot weld	Shear	10	54,110	50,330	52,310

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Before Putting Belts Back in Service

By J. N. SMITH
Engineering Department,
E. F. Houghton & Company, Philadelphia

Many industrial plants undoubtedly have dozens of belts which have stood idle for some time. Before this belting is put back into service it should be carefully inspected and reconditioned if necessary. Belting often deteriorates more rapidly when idle than when in regular use. In addition, many things can happen to an idle belt and invariably the belt will need some attention to place it in first-class condition.

If belts have become soaked with mineral oil degrease them by soaking in gasoline or carbon tetrachloride for 24 hours, or longer if necessary. In doing this it must be remembered that the degreasing not only removes all mineral oil but also the natural oil which is essential to lubricate the fibers of the leather. Therefore, after the belt has been thoroughly degreased, dress it with a good belt lubricant to lubricate and preserve the fibers of the leather.

Check all the laps and see that they have not started to separate, especially the tip of the lap. If it is found necessary to recement a lap be sure to scrape off all of the old cement. Clean the belt off by scraping with a dull-edged scraper with rounded corners. Do not use a sharp scraper as the fibers of a belt must not be injured. The laps should then be thoroughly roughened up, either with coarse emery cloth, a rasp or wire brush, before the cement is applied.

A belt which has been left on an idle drive under tension has no doubt become permanently stretched. Therefore it is wise to remove the belt from the drive and shorten it to the proper length to give the desired tension on the drive. If the drive is to be idle for some time do not install the belt on the drive tight. It is better not to install the belt at all until it is needed.

Fasteners of all types should be gone over carefully. If any of them are either worn or broken they should be replaced immediately. A worn fastener is liable to "let go" at any time. A broken fastener will not only cause the belt to run crooked but will also damage wood or composition pulleys.

Pulley alignment is very important from the standpoint of belt life and transmission efficiency as well as the operator's safety. It should be carefully checked during belt inspection.

Assessment of Utility Plant Lacks Uniformity

Taxation of tangible property used by public utilities exhibits a wide variety of practices, and at present little or no progress in the direction of standardization is evident from inquiries covering utility groups in some half dozen states. These inquiries were the result of an effort to determine whether assessed values placed on hydro-electric plants and transmission lines were in any way approaching uniformity. It appeared from the preliminary survey that local assessing boards in general desire to co-operate with the utilities in valuing plant, and that as a rule the technical aspects of such capital investments and the going value of plants and lines as parts of systems are not considered by local taxing authorities. Broadly speaking, assessed values are based on rough totals of the dollar investments made in such plants and lines as assemblies of concrete, steel, building material, copper, aluminum, poles, towers, insulators, etc. Bankers' prospectuses are considered by local assessors in some cases, but taxable values are ordinarily cut down sharply from the totals, which may be expressed in such published material in available valuations by engineers or otherwise.

The experience of one large power company gives a fair cross-section of the situation in one region. The local assessors pay little attention to the kilowatt capacity of developments, but are sometimes influenced by the annual output of the plant in kilowatt-hours. Cost figures are sometimes used as a starting point; then other elements are considered, and finally the basis of valuation of other properties in the same town is applied. On this system this basis varies from 30 to 75 per cent of the fair value. Thus, if a piece of property has recently been transferred (willing buyer and willing seller) at a price of $5,000, and the same property is valued on the assessors' books at $2,500, it is fair to assume that the basis of valuation is 50 per cent. A general knowledge of property values in each town is a very material factor in fixing valuations for taxation. On this system and on another in the same region it is customary for the right-of-way department to compile thorough data on field construction costs, including all overheads, and to check local boards' valuations of hydro plants against these costs written down by the percentage as above determined. Tax bills are as carefully studied as any operating expenses and bills are gone over with assessors to bring about harmonious agreement on all doubtful figures.

In a representative case the "bare bones" cost of a 15,000-kva. hydro-electric development was $95 per kva., including dam, forebay, station building, machinery, step-up substation and tailrace—the material property in place. The total of $1,420,000 was reduced by 50 per cent by the assessors for taxable value, or to $710,000. On a local tax rate of $25 per thousand, the assessment figured $17,750, or $1.18 per kva.

On transmission lines it generally occurs that higher costs are associated with higher voltage construction. In the system territory, which includes many rural communities, it is generally understood that no additional expense to the town for schools or roads, bridges, snow removal or support of the poor is involved by reason of line construction. High valuation on distribution lines does not encourage rural extensions, and this is widely recognized. An analysis of the values placed by 100 towns on distribution lines showed that the assessors figured these at $360 per mile. Some 150 miles of 110-kv. line have been built by this company within the past four years, and at a cost of a little over $4,000 per mile. A uniform valuation for taxation purposes at $2,000 per mile has been placed by the towns through which this line runs. The average value placed on lower voltage and other transmission lines for taxation purposes in 100 towns on the system is $650 per mile.

Representative opinion favors the practice of locally assessing plant and line taxes in preference to centralizing these in a state board. At present, in the areas surveyed, the best results appear to flow from frank and friendly discussions of all moot points between company representatives and municipal assessors.

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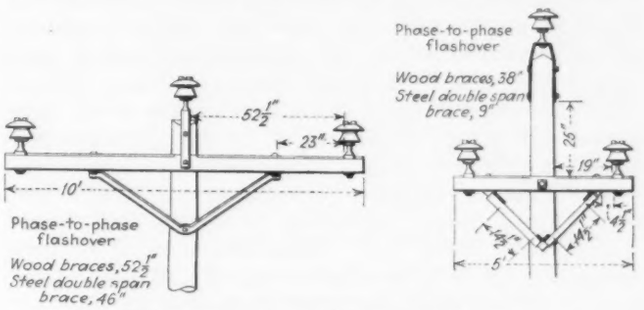
Revising Lines to Benefit from Wood Insulation

By B. E. ELLSWORTH

Iowa-Nebraska Light & Power Company, Lincoln, Neb.

Certain changes may readily be made in existing transmission lines that do not have overhead ground wire protection in order to make them more resistant to lightning flashover by taking advantage of the available wood insulation of the pole and crossarm. All grounded guys, ground plates and ground wires are removed. Wooden insulators are placed in guys and guy attachments are moved down as far as pole strength will permit. Usually wood crossarm braces are substituted for steel braces. In regard to braces, money for replacement may sometimes be spent unnecessarily.

Consider the two assemblies in the accompanying sketch. The assembly at the left, with a 10-ft. crossarm,



When to use wood crossarm braces

will have a wet flashover distance between phases of 52½ in. with wooden braces (neglecting insulators) and 46 in. with steel braces. This gives an increase of 14 per cent in flashover distance by using wooden braces, but it is doubtful whether the increase in cost of wooden braces is justified in this case. The fixture at right has a phase-to-phase flashover of 38 in. with wooden braces and 9 in. with a steel brace, or a gain of 320 per cent by using wooden braces. Wooden braces should by all means be used on this type of fixture.

"New Approach" Opens New Profession

By FRANK B. RAE, Jr.
Rockefeller Building, Cleveland, Ohio

Among the unforeseen and encouraging features of the Edison Electric Institute's autumn lighting activity none is more significant than the instant and widespread success of the so-called "new approach" method of selling improved illumination. This sales method has been in process of development and refinement for a number of months, the "Mazda" lamp manufacturers and farvisioned utility men co-operating. Field tests covering many thousands of interviews with residential, commercial and industrial lighting customers have proved conclusively that we at last have a light-selling routine which is both interesting and convincing to a heretofore indifferent and skeptical public.

Credit for the evolution of this effective selling process must be divided into many small segments. The bases are the Weston photronic cell and the researches of Luckiesh in the "science of seeing." Sawyer and Canfield of American Gas & Electric seem to have conceived the idea as applied to commercial lighting, Staley, Morrison and Oday of General Electric helping them whip it into shape. Canfield made a 100-call canvass of small commercial customers served by A.G.&E. properties to perfect the technique before presenting it to his organization. In its application to home lighting, Skinner of Niagara Hudson was the pioneer, backing Mary Weber's spectacular Utica experiment. And down in Potomac Edison territory the idea was further evolved into a group-selling procedure which expanded the versatility of the approach.

With this background, it is natural to expect that the new approach would be practically utilized as a sales aid by many of those participating in the Edison Institute activity, but what was not anticipated was that this selling method opens up what is in effect a new profession which hundreds of highly educated men and women are eager to enter. Many of these are utility employees whose previous work has been apart from lighting sales. Many are complete outsiders. The list includes electrical contractors, department store merchandise men, lamp buyers and clerks, employees of fixture houses, manufacturers' representatives, wholesalers' representatives, dealers in and designers of lighting merchandise, advertising men, college professors, architects and special writers from newspapers. Representatives of all these groups have, within the past few months, attended "lighting schools" at which the principles of this new approach to lighting problems are expounded and demonstrated.

So far as the inadequately kept records of the movement reveal, the first such school was conducted by General Electric at Nela Park for the benefit of 25 young women sent there from Buffalo by the Niagara Hudson Power Corporation after Mary Weber had demonstrated the effectiveness of the idea through her "Utica experiment." In addition to the Buffalo students a scattering of lighting service girls from Indiana General Service Company and the commercial manager of one of the larger utility syndicates attended this early school course, but what surprised the sponsors most was that two young women having no connection with any branch of the lighting industry asked permission to attend; they wanted to take it up as other girls take up stenography or nursing —as a definite skilled profession. The same thing happened at a lighting school held in New York City. In addition to the 29 students then actually engaged in selling lighting who were sent by eight utilities serving the metropolitan area, there was one from the Bowser lamp service organization and two unattached young women who appreciated that with this training they would qualify for positions as home-lighting experts. A professor from the University of Kentucky recently attended a five-day course; an architect attended another.

A notable sidelight is the interest shown by contractors, dealers, department store people, wholesalers and manufacturers in the lighting field—groups who (generally speaking) have evidenced little concern during the past few years in anything but price. They now want to know what it is all about; they are keen students at the school sessions, and after training they cannot but be very valuable allies of the utilities in their fight for "Better Light—Better Sight." Ohio Edison recently held a meeting to discuss a proposed "trade" lighting school scheduled to run one evening a week for five weeks; 37 contractors, 21 wholesalers' representatives, two fixture dealers and eight manufacturers' representatives attended. At a Nela Park school were sixteen manufacturers' representatives. The Alabama Power school drew a number of contractors and dealers, exact number not available.

It is impossible to ascertain the number of utility lighting salespeople who have taken school courses in the new approach. In New England 34 utilities were represented; in Cleveland, 37; in New York, eight; in Birmingham, four. The representatives of these utilities, when trained and put to work, pay their year's salary and expense out of the first six months' estimated lighting revenue, and in addition sell as much lighting merchandise, either for the utility or the local dealers, as the first year's revenue amounts to. This approach silences customer complaints, wins customer good will, and for the first time in the industry's history enables the customer really to appreciate the use and value of the lighting service the utility offers.

Of course the idea of a lighting school is not new. Such schools have been going on and doing good for years, but they were generally attended only by illuminating engineers and lighting specialists, were devoted largely to technicalities, their teachings were difficult to interpret to the public. These new lighting schools are different. They teach a procedure which transforms light from an intangible necessity into desirable merchandise. They open up a new profession.

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Urges Caution in Erecting Joint or Dual-Service Plants

In some instances it will be found that the only feasible way of obtaining all or part of the load of a power prospect operating his own power plant is by some form of interchange agreement or in some cases by a joint plant project sponsored by the industrial customer and the utility. There have been some instances where such schemes have worked out satisfactorily. There are prob-

ably others where they have not. The same might be said of small plants which have been built entirely by utilities for the purpose of supplying steam to industries and furnishing by-product power to their own systems.

Where plants of this kind are considered it is absolutely necessary that each be worked out on its own merits, taking into full consideration the important fact that the rate of return on money spent by an industrial company must be higher than for a utility and that there is always some question as to the permanency of operation of the industrial plant. H. C. Thuerk, Utility Management Company, has come to the conclusion that where a utility contemplates installing its own steam and generating station in an industrial district it must be built with the full realization that at any time it might be necessary permanently to operate the station as a straight power-producing unit.

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BOOK REVIEWS

A.S.T.M. Standards on Electrical Insulating Material

Published by American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa. 242 pages. Price, $1.25.

All of the 32 A.S.T.M. specifications and test methods concerning electrical insulating materials are assembled here along with the 1933 report of the committee on this subject. The latest revisions pertain to varnished tubing, bias varnish tape, asbestos roving, molded materials, oils, splicing and pothead compounds, graded natural mica, etc. Some of the standards and tests are tentative, others definitive, but in any event the electrical laboratory will find here the latest authority on insulation testing.

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Electrons at Work

By C. R. Underhill. Published by the McGraw-Hill Book Company, 330 West 42d Street, New York, N. Y. 354 pages, illustrated. Price, $3.

No great amount of violence to rigor has been done by Mr. Underhill in his effort to popularize electronics. Scrupulously avoiding mathematical derivations, he does, nevertheless, give a good quantitative picture of current flow, magnetic behavior, electrostatics, alternating and oscillatory currents, all expressed in terms of the new common denominator, the electron.

No attempt is made to display any large number of illustrations of actual circuit applications of electronic tubes to perform industrial control functions. On the contrary, the author aims to provide a realignment of the concepts of fundamental electrophysics so that those who will expand industrial uses of all kinds of electronic devices can have a most favorable point of departure. It certainly seems sound to hope that the most fruitful advances will originate with those who will have acquired a lucid comprehension of electronic behavior rather than from those who would strive merely to imitate radio "hook-ups."

Naturally the photo-electric cell is treated and amply so, there going with this treatment a discussion of luminous and invisible radiations. Properly received and cultivated, this book should be extremely helpful in furthering intelligent experimentation of the sort that is most likely to usher in the grand age of electronic application that is certainly ahead of us.

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Five Bulletins of Edison Electric Institute

(420 Lexington Ave., New York, N. Y.)

(A9) A.C. Network Operation in 1931. (N.E.L.A. Underground System Committee). Price, 20 cents to member company employees, 50 cents to U.S.A. non-members.

Fifty-two companies report experience with protectors, transformers, feeders and secondaries on networks totalling 1,719,224 kva. of transformer capacity. Practice as to feeder supply, boosters and voltage regulation are analyzed in detail as are the causes of failure of protectors to function perfectly. There is tabulated data about network transformer sizes and failures and also on the secondary practices and faults.

(A4) Burning of Liquid and Gaseous Fuels (N.E.L.A. Prime Movers Committee). Price, 30 cents to member companies' employees, 75 cents to U.S.A. non-members.

Operating companies and manufacturers report and comment on heat liberation rates, gas metering, results of conversion to oil or gas fuel, automatic combustion control, explosions in settings and breechings.

(A5) Power Station Chemistry (N.E.L.A. Prime Movers Committee). Price, 40 cents to member company employees, $1 to U.S.A. non-members.

Discusses methods of water analysis, chlorination and phosphate treatments, electrolytic prevention of scale and corrosion, and slag accumulation in furnaces.

(A7) Stoker Equipment and Furnaces. (N.E.L.A. Prime Movers Committee). Price, $1.50 to non-members in U.S.A.

Combustion air, zoned air control, stokers, furnace temperature with bare water walls, air-cooled and refractory-faced water walls, air preheater corrosion and fouling. Operating experience, tabulated installations, manufacturers' improvements.

(A16) Load and Revenue Forecasting. (N.E.L.A. Power Systems Engineering Committee)

Principles and theory of forecasting, detecting approach to saturation, correlation of rate and consumption experience with technique of forecasting and general business indexes.

(A-17) Promotion of Home Air Conditioning. (N.E.L.A. Home Air Conditioning Committee). Price 50 cents to non-members in U. S. A.

Presents methods used by St. Louis, New Orleans and Public Service Company of Northern Illinois for publicizing and promoting air conditioning in the home.

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The Practice of Spectrum Analysis

By F. Twyman. Published by Adam Hilger, Ltd., London. Price, 3s 6d.

Five editions of this pamphlet have preceded this one, which records the recent advances in quantitative and qualitative spectrum analysis along with the techniques of the spectroscope and its laboratory adjuncts, such as the logarithmic wedge sector, microphotometer, etc. Its value to the electrical research worker lies primarily in the practical aid it gives to the use of the spectroscope for studies of arcs, sparks and incandescent filaments.

Men of the Industry

Hibben Directs Lighting for Westinghouse Lamp

Samuel G. Hibben, manager of the commercial engineering department of the Westinghouse Lamp Company for the past fifteen years, has been appointed director of lighting, in accordance with an expanding program of illumination progress, with headquarters at Bloom-

field. In this position he will function as an ambassador-at-large on all lighting activities.

Graduating from Case School of Applied Science in 1910, Mr. Hibben served as illuminating engineer with the MacBeth-Evans Glass Company in Pittsburgh, when he built up a lighting service and design department. Several years later private enterprise called him into consulting engineering work, but within the year he joined the engineering staff of the Westinghouse Electric & Manufacturing Company, later directing industrial and commercial lighting in the Pittsburgh office of the Westinghouse Lamp Company. Following military service in this country and abroad during the World War, Mr. Hibben went to Cleveland as branch manager of the Westinghouse Lamp Company, but the following year he was called to Bloomfield to develop a lighting service bureau which subsequently became the present commercial engineering department. While heading this department, Mr. Hibben became identified with many outstanding lighting installations in this country.

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KARL B. MCEACHRON, lightning research engineer at the Pittsfield works of the General Electric Company, has been appointed engineer in charge of high-voltage practice, taking over the research work conducted by the late Frank W. Peek, Jr., until his death by accident last summer while in Canada. Mr. McEachron is a native of Hoosac Falls, N. Y., and was graduated in 1914 from the mechanical engineering course at Purdue University. He taught engineering from 1914 to 1918 at Ohio Northern University, and from 1918 to 1922 was research assistant at Purdue. He became attached to the Pittsfield works in 1922 and has since specialized in lightning research, pioneering in the use of the cathode-ray oscillograph in this country, being active in the development of the Thyrite arrester, and contributing notable professional papers to the art. He received the Coffin award for his work in insulating engineering.

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OBITUARY

FREDERICK P. ROYCE, vice-president and treasurer of Stone & Webster, Inc., Boston, died, of a heart attack, November 5, at his home in Dedham, Mass. He was 65 years of age. For many years Mr. Royce was a leading figure in the public utility field and had successfully managed many power and light companies under Stone & Webster management. A graduate of the Massachusetts Institute of Technology in 1890, he became associated with the Thomson Electric Welding Company, and six years later was appointed treasurer of the Malden Electric Company. After serving as manager of the Springfield Gas Light Company, the Malden & Melrose Gas Light Company, Concord Electric Company and the Fitchburg Gas & Electric Company he became associated with Stone & Webster in 1909. When the Brooklyn Rapid Transit system went into receivership in 1919 Mr. Royce was appointed general manager and intrusted with the task of reorganizing the corporation. It was in 1930 that he assumed the duties of vice-president of Stone & Webster.

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DAVID P. GALLANT, a member of the staff of the Thomson Research Laboratory at the Lynn Works of the General Electric Company, died October 31, following an illness of three weeks. He was 59 years of age.

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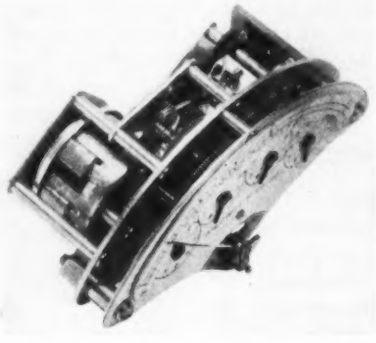
New Equipment Available

Maximum Demand Meter

A maximum demand meter attachment which takes the place of the register already on the watt-hour meter and registers the maximum demand in kilowatts without interfering with the kilowatt-hour reading of the meter has been announced by the Retlau Electric Appliance Corporation, New York. This demand register is said to be fully as practical and efficient as the meter itself and is capable of installation by the ordinary meter man.



The Retlau timing element consists of a small, horizontal type synchronous motor running 600 r.p.m. and is designed especially for long life and strong self-starting and running power. By using the horizontal type motor equipped with extra large self-oiling phosphor bronze bearings all bearing trouble is eliminated. The timing motor drives a small train of fiber and bronze gears, which in turn operate two cams at the end of a clutch lever. The demand pointer is of non-magnetic material and perfectly balanced, thus being unaffected by vibration or jar. The scale is designed for easy reading, all divisions and subdivisions being in kilowatts and one-tenth kilowatts.

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THE WESTINGHOUSE LAMP COMPANY, Bloomfield, N. J., has announced an inside frosted tubular "Mazda" lamp of 250 watts for special use in indirect portables. This lamp is designed for base-down burning only. The 250-watt lamp in properly designed equipment will produce illumination of an intensity equivalent to the 300-watt lamp when used in present-day indirect portables.

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WEATHERPROOF OUTLETS that will facilitate the use of outdoor lighting fixtures and appliances are announced by the General Electric Company. Made of brass and cadmium coated, they resist rust and corrosion. The flush plate has a solid rubber pad mounted on the back, insuring a snug fit when the device is screwed in place.